

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XL
Number 14

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, APRIL 3, 1919

GENERAL LIBRARY

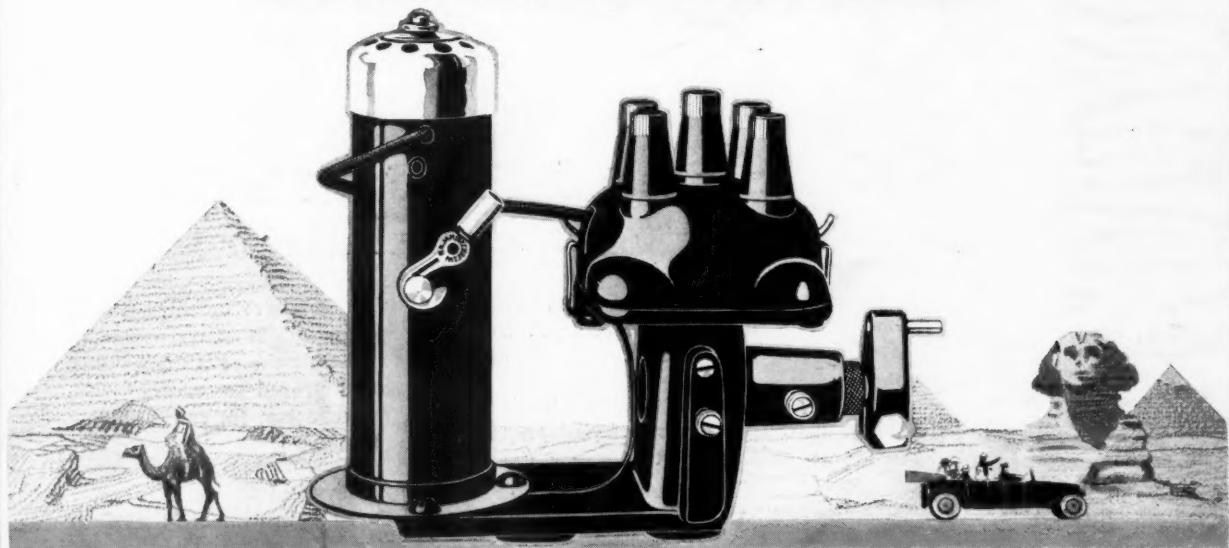
APR - 7 1919

Fifteen cents a copy
\$1.50 a year.

Engineering
Library

Simple in Construction—Unfailing in Performance

ATWATER KENT SCIENTIFIC IGNITION



Durability

YOUR Atwater Kent System is so simply and sturdily constructed that its operating efficiency does not become impaired with long use.

There are no rubbing brushes, magnets or complicated mechanism to bother about. It will replace your magneto with better ignition and outlast any motor.

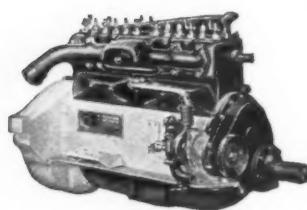
Write for copy of our booklet, "Selling Atwater Kent Ignition"

ATWATER KENT MFG. WORKS *Philadelphia*

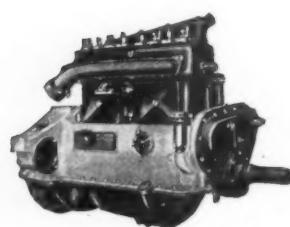
SEE YOUR DEALER OR WRITE TO 4938 STENTON AVENUE



His Strongest Selling Point is the Red Seal Continental Motor



America's Standard Passenger Car Motor. Look for the Red Seal Nameplate.



America's Standard Truck Motor. Look for the Red Seal Nameplate.

The argument that most often clinches the sale of an automobile or truck is the Red Seal Continental Motor.

For there is hardly a man who is not familiar with the record of *past performance*—the infallible test of motor worth—which has distinguished this motor for well over a decade.

On hundreds of thousands of automobiles and trucks, under every conceivable condition of service, the Red Seal Continental Motor has *proved* its 100% dependability. In the supertasks of war, in the vigorous tasks of peace, it has stood the test of service.

Today upwards of 15,000 dealers have signified their belief in the Red Seal Con-

tinental Motor by entrusting their business prosperity to Continental-equipped cars. And their choice is the Continental because of its proved record for power, for speed, for economy, for reliability.

Today more than 160 successful manufacturers of automobiles and trucks equip their output with Red Seal Continental Motors. The judgment of these manufacturers is vindicated by tens of thousands of owners who will have no other motor.

Look for the Red Seal on the motor in the car or truck you buy—and *be sure*.

Continental Motors Corporation

Offices:
Detroit, Michigan

Factories:
Detroit—Muskegon

Largest Exclusive Motor Manufacturers in the World

Continental Motors

STANDARD POWER FOR TRUCKS, AUTOMOBILES AND TRACTORS

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XL

NEW YORK—THURSDAY, APRIL 3, 1919—CHICAGO

No. 14

America Influences Europe's New Cars

Left-Hand Steering Is Here—Two-Unit Electric
Units Popular—Vacuum Fuel Feed Adopted
—Many Double Rear Wheel Brakes—
Quieter Colors—New Berliet, Peugeot,
Fiats and Others at Lyons Trade Fair

By W. F. Bradley*

LYONS, FRANCE, March 10—The trade fair which is being held here unites 4700 exhibitors with \$4,000,000 worth of goods, and has become so big that it has been decided to split it into two parts, one to be held in the spring and the other in the fall. The automobile section, which has its own special building in the fair, will be included in the spring meeting.

The automobile section this year is just sufficiently big and important to give an indication of what is going to happen in France during the next 6 months. An interval of rather less than 4 months has elapsed since the signing of the armistice, this being too short a time to allow more than a few makers to get out new models. But while the majority of the cars are pre-war types, with the addition of electric lighting and starting, there is quite enough revealed or announced to allow an accurate summary to be formed of coming activities.

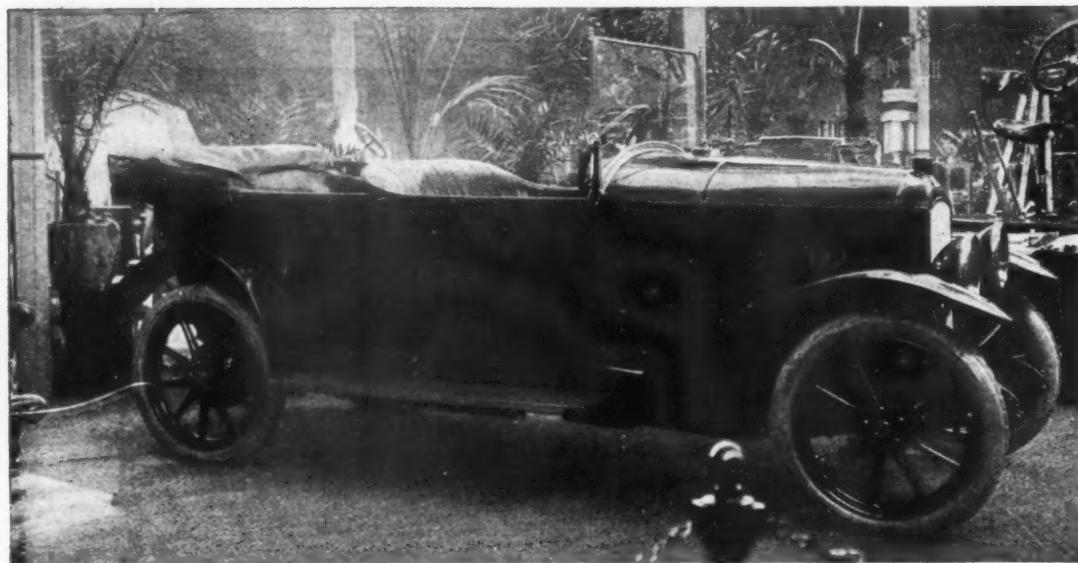
Entirely new cars have been built by Delage, Berliet, Fiat, A.S.S., Peugeot, Rochet-Schneider, Citroen and Sigma. All the others are intermediate models.

European Ford Wanted

While the number of entirely new cars on exhibition is small, plenty of information was available at Lyons regarding the immediate program of automobile concerns and on the general tendency of design. There is undoubtedly a great demand in France for what may be termed a European Ford; this is a car as near as possible to the Ford price, carrying four passengers comfortably, but having a better appearance and a lower gas consumption than the Ford. Up to the present there is no such car on the market, nor clearly in view.

The tendency has been toward a very small, light car, of the Citroen type, which is very satisfactory as a two-seater, but not so suitable with a four-seater body. It looks as if the new Peugeot will get very near this class, for one of the Peugeot factories will be given over en-

*Editor's Note—Mr. Bradley attended the Lyons Fair for the exclusive service of the *Class Journal Company*. Previous to the opening of the show he visited many of the French factories.



The new four-cylinder, four-passenger Peugeot which has been designed for quantity production. It has a unit power plant, is equipped with electric lighting and starting system and is driven from the right side

tirely to the production of this car, and it is evident that the design has been worked out with a view to low production costs.

France's Assembled Car

A group of ten French automobile manufacturers has been formed to build a joint cheap car. Each factory will build the component for which it is best equipped; a special erecting shop will be established, and the car will be marketed to the benefit of the ten firms concerned. At present it has not been decided what price this car will be sold for, nor what its main characteristics will be. In all probability it will not get as low as the Ford price in America, but it should be possible to sell it at an unheard of price for France. French manufacturers as a whole are not disposed to get down to the grade of production of the cheaper American cars.

Progress in Production

Simplified methods of construction and labor saving devices are coming along fast, but the idea of the rough finish which is associated with all the cheap American lines is distasteful to the French maker. Present prices must not be taken as a criterion, for raw material is still high and even scarce. A very big drop is expected within one year.

Very few factories are going to build a single model. Quite a number, however, will be satisfied with two types, while it is generally accepted that there is no need for any firm to build more than four models.

Peugeot's Quadrilette

In addition to its 10-hp. light car, Peugeot will put on the market a 12-hp. medium, four-cylinder, five-passenger type and a high-class, six-cylinder, valveless seven-passenger car.

An entirely new venture is what is known as a quadrilette, this being a machine intended to take the place of the motorcycle and side-car. It will have a four-cylinder engine and worm drive.

Renault's Fall Model

Next October Renault will put out an entirely new model four-cylinder car of 2.9 by 4.7-in. bore and stroke, with three-speed gear-set, left-hand steering, detachable wood wheels, with tires of 760 by 90 mm., electric lighting and starting. The price of this chassis will be \$1,350 complete with everything except lamps.

New Renault Factory

Renault has the biggest automobile factory in France, and the second biggest in Europe, his regular staff being 25,000 workpeople. Recently he has laid plans for the erection of a new factory at Le Mans, 150 miles southwest of Paris, where 5000 workpeople will be employed. Here he will build trucks, agricultural tractors, trailers and some railroad material. A large number of houses are being erected for the workpeople and a big hotel for the unmarried men. There will be three clubs, baths, swimming pool, infants' school, nursery, a medical hall, a theater, picture hall and music kiosk.

Gnome Builds Cars

The Gnome and Rhone aviation motor company has entered the automobile field and will build Picard-Pictet cars under license in their two factories near Paris. The models to be produced are a 10-hp. and a 14-hp., four cylinders, as well as a 28-hp. eight cylinders. All three models are to be equipped with electric lighting and starting, mechanical tire pump, speed indicator and accessories. It is understood that the size of the eight-cylinder car will be 85 by 130-mm. bore and stroke, and that this model will be fitted with front-wheel brakes. At the Lyons Fair the Picard-Pictet Company exhibited the Argyll type of single-sleeve-valve engine.

Dietrich Six and Twelve

Lorraine-Dietrich, who has specialized on aviation motors during the war, will produce two six-cylinder cars and one twelve, all being high-class jobs.

General European Trends

THE general tendency of European construction is now very clearly defined. The four cylinder engine is holding its own, but for high-class jobs the six will predominate. Eights will come next in line, with twelves last on the list. Up to the present only one eight has been produced commercially in France, this being the original De Dion Bouton. In addition to the Gnome eight, it is very probable that an eight-cylinder engine will be brought out by Darracq.

Fiat Uses Detachable Heads

Detachable cylinder heads are making their appearance slowly, but will certainly become more popular during the next 12 months. Fiat has been the first to make a

decided move in this direction, by adopting detachable heads for all models, from the cheapest to the most costly. As Fiat has always been very proud of the cleanliness of its design and has never made a mechanical change without long preliminary tests, it is certain that this example will be followed.

Battery Ignition Appears

The tendency to drop the magneto and rely on the batteries for ignition is being manifested very slowly. Engineers, particularly those who have an eye to low cost of production, are convinced of its soundness, but the sales organizations are rather afraid of offending the public, which has been educated to believe that the only reliable ignition is by means of high-tension magneto. Nevertheless, some high-class cars to be shown at the Paris Salon next October will be minus a magneto.

L-Head Engine Continues

The L-head type of engine holds its own without any difficulty. Engineers have given attention to the over-head-valve type, but where in favor state that it will not be brought out for 2 years yet.

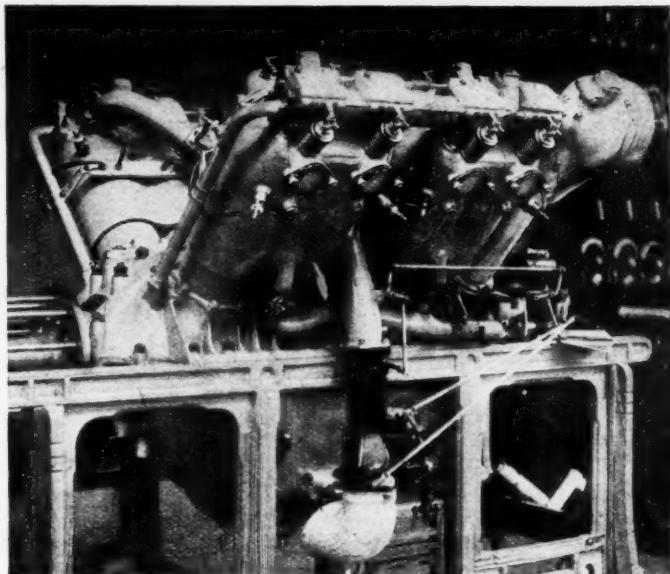
The most popular method of driving the pump and the magneto is by means of a transverse shaft. This is found on all the Fiats, on the new Delage, on the new Cottin-Desgouttes, on the Renault (in this case, of course, there is no pump). The position tends to complete accessibility by putting the business ends of these two organs outwards, where they can be readily reached.

There is nothing to indicate that thermo-syphon is ousting the pump. Where the engine has less than 3-in. bore natural water circulation is in a slight majority, but above this size the water pump is nearly always used, the only important exception being Renault, who refuses to fit a pump whatever the size of the engine or whatever the work it has to perform. The reasons for this are of a personal and not of an engineering nature.

Front Radiators Gain

The practice of placing the radiator back of the engine has lost ground. Th. Schneider and Charron, who before the war had radiators at the rear, have dropped this position for the more conventional one in front. Renault is now practically alone in this style of construction.

On the new Cottin-Desgouttes engine the transverse shaft drives not only the magneto and water pump at



Carburetor side of the eight-cylinder Lorraine-Dietrich aviation engine, showing the overhead valve mechanism

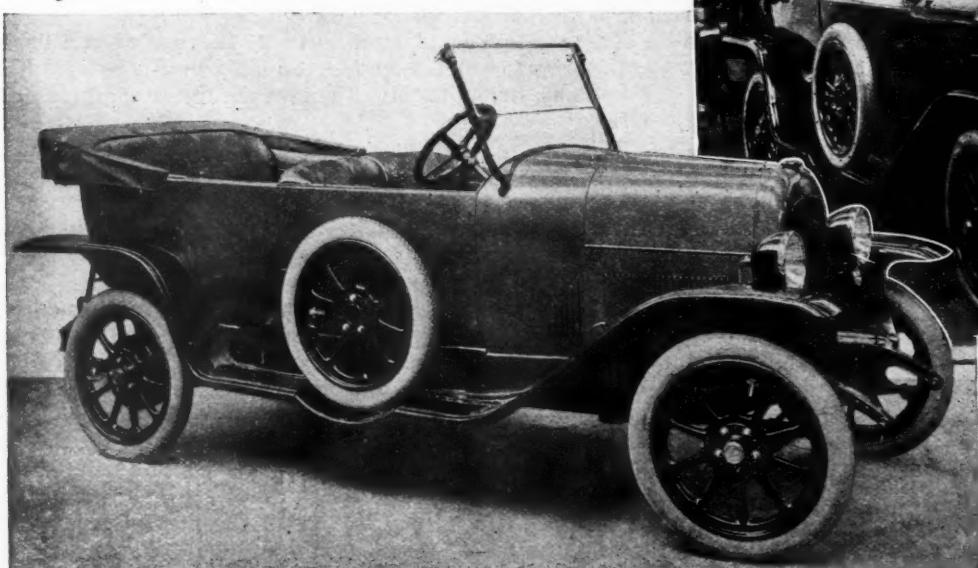
each end, but the fan and a two-cylinder tire pump. This is one of the few cars fitted with a power inflator.

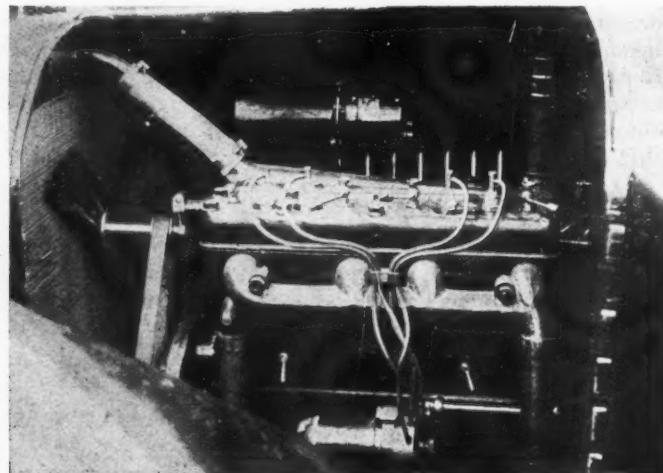
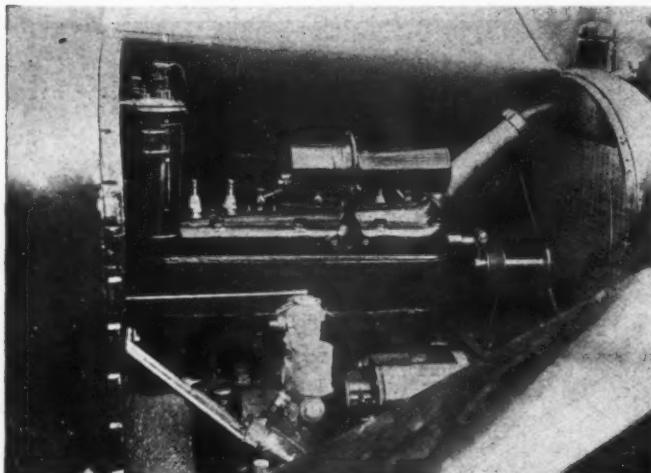
Vacuum Fuel Feed

The tendency everywhere is to bolt carburetors direct up to the cylinder casting on the side opposite to the valves and to feed gasoline to the carburetor by the vacuum system. The pressure system has practically gone out of existence, while gravity feed is only being used for small cars where a tank on the dashboard is not of sufficient size to cause any inconvenience. Makers of high-class cars have had two years' experience with the vacuum system, and in their opinion it is most satisfactory, provided the apparatus is individually tested for the car to which it is fitted. They find that as received from the manufacturers the outlet from these appliances vary considerably, and it is necessary to



These are the two new Fiat models, the one at the left being the 12-16-hp. model and the one above the 10-hp. model





Both sides of the new Berliet four-cylinder engine, which in many respects closely follows accepted methods of American design and construction, notably in the use of detachable cylinder head and the mounting of accessories

test them for individual cars to get really satisfactory results.

Forced-feed lubrication with a drilled crankshaft, oil being supplied under pressure to the main bearings, the camshaft bearings and to the connecting-rod ends, other parts being fed by the overflow, is the system most extensively employed. More attention has been paid to the ready removal of filters and pumps, and with this object in view many makers who formerly placed the pump on the end of the camshaft now locate it in the base chamber. As the tendency is to get away from a mud pan, and to fill in the space between the crankcase and the frame members, this adds further to accessibility. Several makers carry a supplementary oil tank in the engine or in the chassis. Hispano-Suiza has done this for a considerable length of time. Cottin-Desgouttes has a 1-gal. supplementary oil tank cast on the side of the crank chamber, and communicating with the base by means of a passage and screw-down needle valve. Charnier-Walcker and La Buire both provide systems of renewing the oil supply without pouring direct into the base chamber.

Unit Powerplant Gains

Unit construction of engine and gearbox is being adopted by practically everybody. Very few makers indeed are casting cylinders and crankcase together; in some cases the reason for not doing this has been the difficulty of getting good castings. The cylinders are thus mounted on an aluminum base chamber, and to this latter is attached the clutch and gearbox housing.

There is no uniformity in the method of attaching this unit to the frame. Some have a four-point attachment for the engine, which therefore tends to stiffen the frame at the front. Others bolt to the side members and to a forward cross member, while a certain number have a true three-point suspension, with rigid attachment to the frame and trunnion attachment to the front cross member.

On the lighter chassis the tendency is to have only three cross-frame members; one at the rear, one at the front, and another at the forward point of attachment of the rear springs.

The only really high-class job which departs from unit construction is the Rochet-Schneider. Here the engine is on a subframe and the gearbox carried on two cross members in the center of the chassis. While the details are well carried out, the feature of this design is quite contrary to the general tendency.

Left-hand steering, with center control, is coming along. Renault is going to adopt it for his new popular model. Citroen has already adopted it. The real objection now is that left-hand steering will not be accepted by English buyers, and as there is little possibility of convincing the English nation of the advisability of changing its singular rule of the road to that of the rest of the world, French firms who count on selling cars in England keep to right-hand steering so as not to have two different types.

Spiral Bevel Strong

The change from bevel and worm to spiral bevel gears is really remarkable in its unanimity. This type of gear is already used, or going to be used, by Fiat, Renault, Panhard, Delage, Darracq, Hotchkiss, Unic, Berliet.

There is a tendency to use lower final gear ratios than was the case four years ago. Thus 4 or $4\frac{1}{4}$ to 1 is common where $3\frac{1}{2}$ to 1 was formerly used. In some of the very small, light, speed engines, for which a big final gear ratio is necessary, worm drive has been adopted. The small Peugeot is an example of this. Another firm which has a very small engine, turning at 3000 r.p.m., maximum, has also adopted worm because of the low reduction required. These seem to be the only cases in which worm is made use of in France.

Many Cantilever Springs

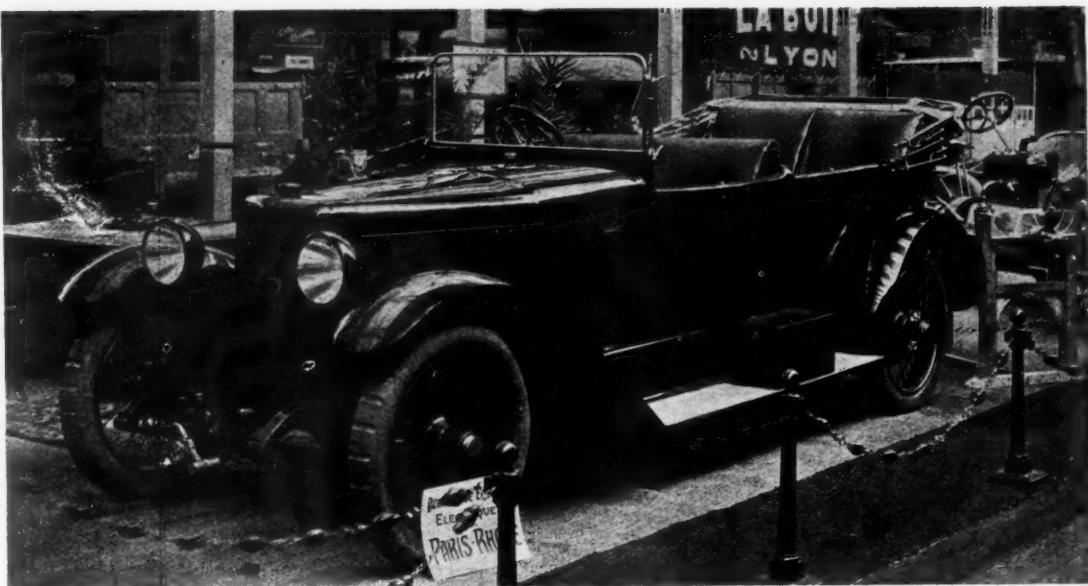
There is an equal unanimity in the use of cantilever rear springs, which have been adopted by Berliet, Rochet-Schneider, Renault, Unic, Peugeot, Zebre, to mention only a few.

More Rear Wheel Brakes

In more cases than ever brakes are all on the rear wheels. Experiments have been made with brakes on an extension of the propeller shaft, back of the differential, but these have not been followed up.

Peugeot adopted this type of brake on an intermediate type of car, but has dropped it on the latest model in favor of two pairs of shoes inside a single drum, each shoe covering practically a quarter of the circumference of the drum. This has been adopted in order to avoid the use of side-by-side brakes, and in working out the details the smallest amount of space has been lost by the brake pins and operating cams. With this Peugeot system practically the entire circumference of the drum is used as a braking surface.

The great majority of makers are satisfied to place



In the newest type of Rochet-Schneider the radiator is placed in front of the engine instead of behind it, and the body is fitted with upholstery which is completely detachable

the two brakes side by side. There are no external contracting brakes. Brakes on the front wheels promise to come along in increasing numbers for high-class cars only. Delage has set the fashion in this respect, and others who seemed inclined to follow are Hispano-Suiza and the Gnome Company with the Piccard-Pictet type car. Delage has exceptionally large braking surfaces, the size of his drums being 15.7 in. in diameter and 2.3 in. in width. In addition to the four brakes of this size on the wheels there is a hand brake on the transmission.

Sober Color Schemes

It is probably owing to the war that there is quite a sober tendency in color schemes. Dark blues, grays and blacks predominate; very few cars, indeed, are seen with gaudy color schemes.

The only novelty in bodies shown so far is the use of detachable upholstery. The back cushion, instead of being fixed in, is made detachable, just the same as the seat. This applies also to the side arm rests.

Where right-hand steering is retained the levers are always inside the body. It has not always been an easy matter to get them in, and on the new Brasier the brake lever is carried up much higher than the change-

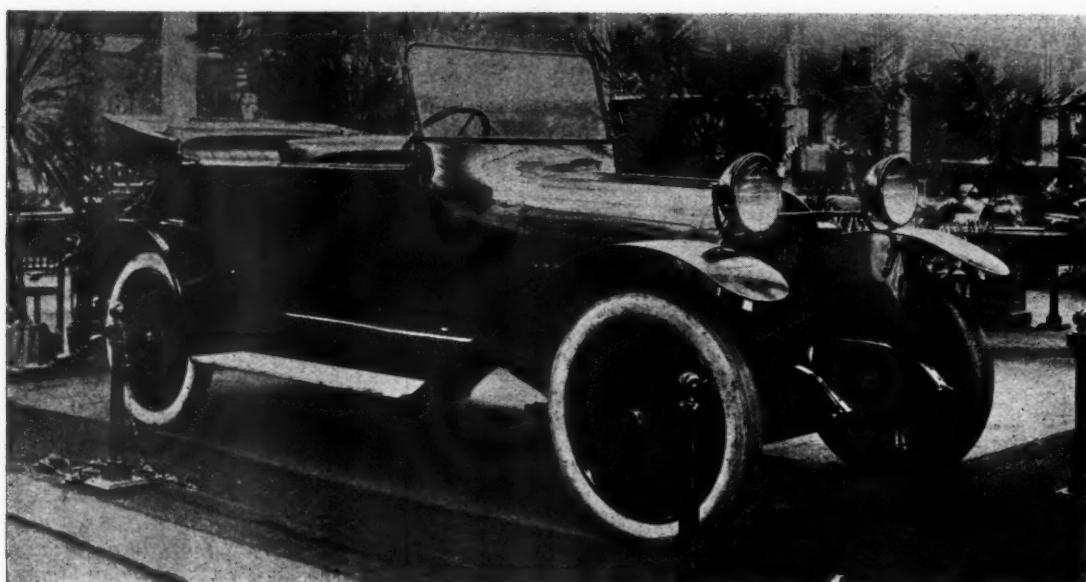
speed lever, and the handle placed at high angles to the body of the lever.

Polished aluminum dashboards are being rather extensively used for high-class cars, with a polished-wood board for carrying the instruments only.

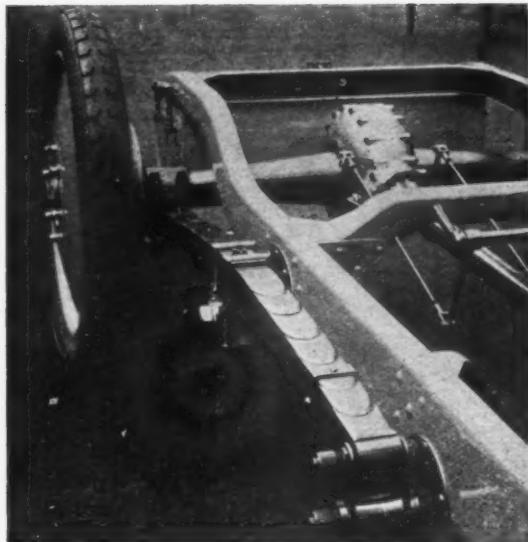
Two-Unit Electric Sets

Two-unit sets predominate for lighting and starting. So far as can be ascertained, the single unit is only employed by Berliet and Cotton-Desgouttes. There is no great amount of uniformity in the placing of the electric generator. Where the pump and magneto are driven from a cross shaft, the generator is generally put fore-and-aft on the valve side, as is the case with Delage and Fiat.

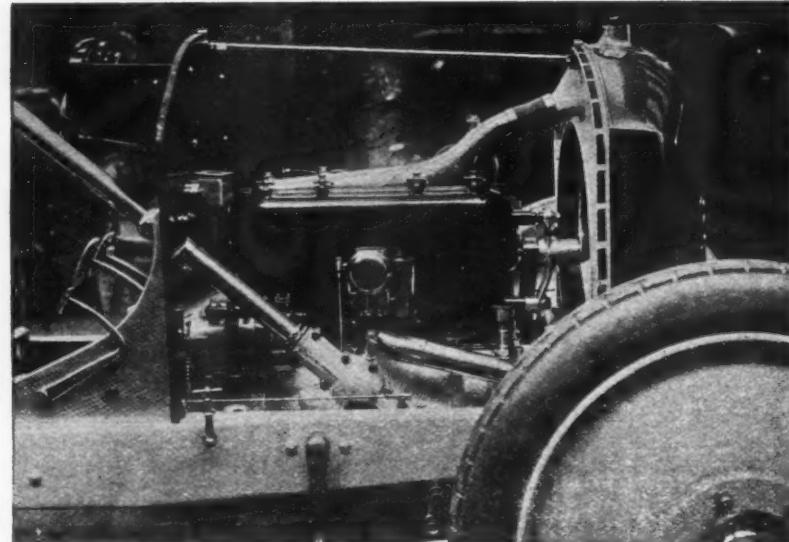
The only big firm building its own electric equipment appears to be Fiat. The others apply to specialists, of whom there are now a large number in France. One of the biggest companies is the S. E. V., of which Renault is a big stockholder. This company took over the small Bosch factory, abandoned in 1914, and in it built the Bosch-type magneto. The works have grown enormously since 1914, and now produce all kinds of electrical material for automobile use. Other big producers of elec-



The Berliet, which is produced by one of the most important manufacturers in the Lyons district, has been designed to approximate very closely the appearance of the average American car. It is equipped with a four-cylinder engine, North-East lighting-starting system and has disc wheels with detachable rims



Rear cantilever springs on the Rochet-Schneider



Carburetor side of the Rochet-Schneider four-cylinder engine

trical equipments are Bleriot, Grouvelle & Arquembourg, Nilmelior, and Lavalette.

Michelin is making a great effort to popularize steel disk wheels for use on passenger cars. It looks as if these will become popular, for they have the advantage of elegance, easy cleaning, and great strength. The only point that can be brought against them is that they are a little heavier than wood. The two biggest makers, Fiat and Renault, are not adopting Michelin wheels. The former will make use of Sankey type steel-spoke wheels, while the latter is using his own type of detachable wood wheel. There is no doubt, however, that wood is losing ground rapidly, even for touring cars.

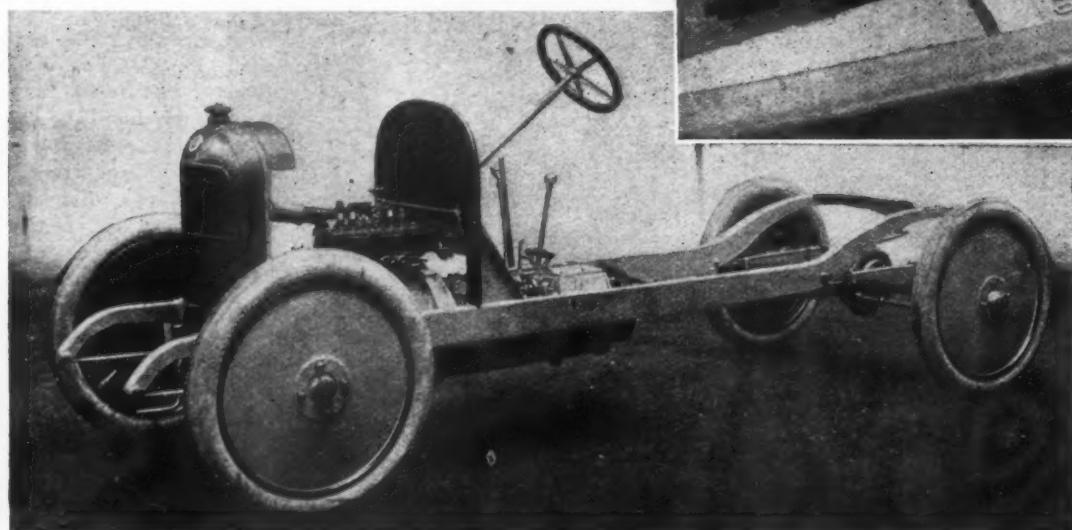
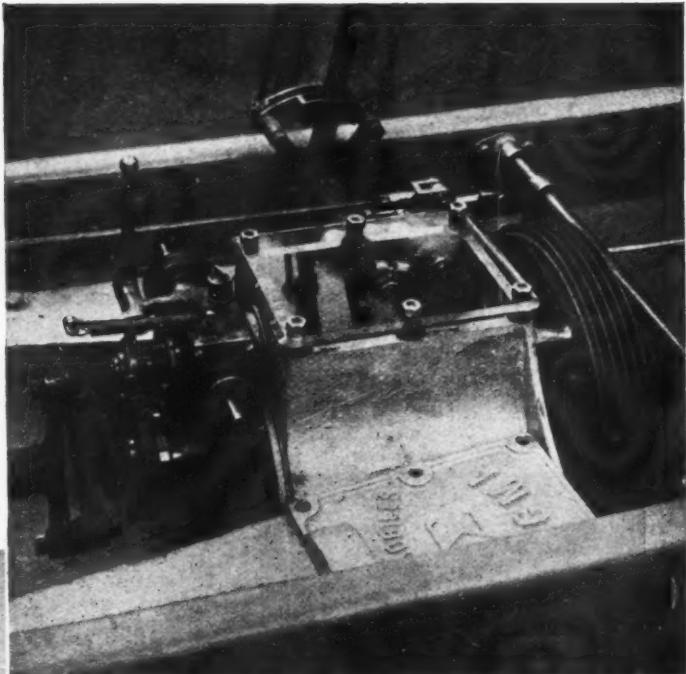
Berliet Brings Out New Car

Berliet, who is the most important automobile manufacturer in the Lyons district, with a factory employing 10,000 workpeople, has come out with a new five-passenger car entirely on American lines. The engine is a four-cylinder, 3.5 x 5.5-in. bore and stroke, with detachable head, North-East electric generator and starter, a Berliet carburetor and a French magneto. It has cone clutch, three-speed gearset with center control, left-hand steering, spiral bevel gears with Timken bearings in the rear axle, and is sold complete with all accessories, including an American horn and speedometer.

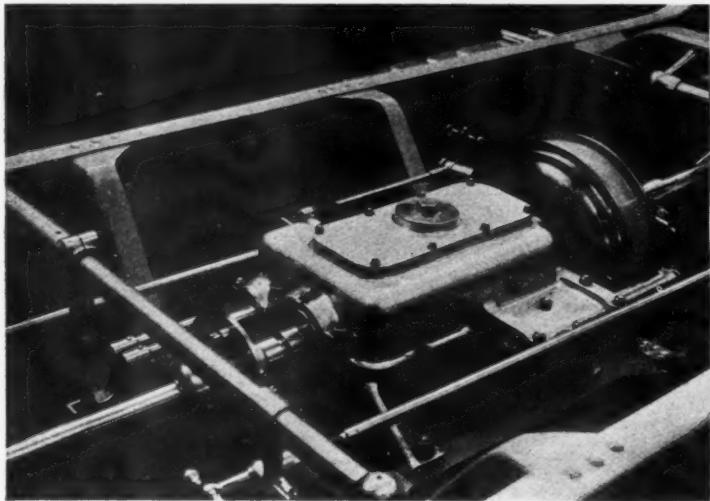
Where it departs from American practice is in the use

of cantilever springs at the rear and steel disk wheels with detachable clincher rims.

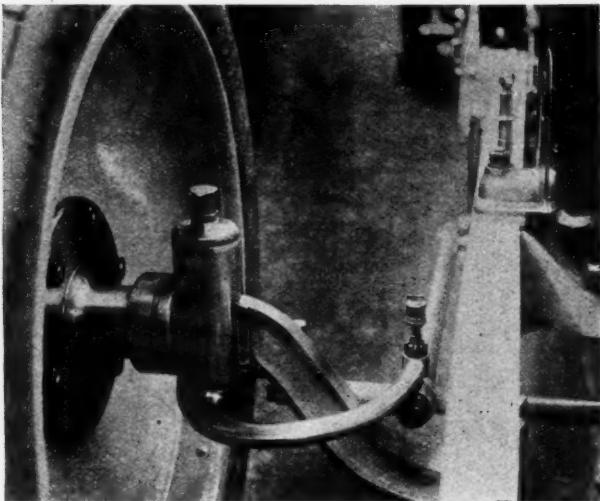
The finish is all black, and with the exception of the name on the radiator, the car looks like an American production. It is being sold complete at \$2,350. According to a statement made at the Berliet factory, this will be the big production job of the works; in addition, a high-class car will be marketed.



Left—Chassis of the Sigma light car, which is equipped with Michelin disc wheels. Above—Gearbox of the Sigma, showing location of the tire pump



Centrally located gearset in the Rochet-Schneider



Application of dust covers to the steering pivots on the Rochet-Schneider

Berliet has capacity for production on a big scale. The original factory has been considerably enlarged during the war, but in addition to this an entirely new factory has been erected a few miles from Lyons, where the whole staff of 10,000 workpeople could be employed. The works are up to date and fitted with the most modern machinery. For the last 2 years Berliet has kept an engineer constantly in America for the purpose of buying machinery. In addition to this M. Berliet has himself made numerous visits to America so as to keep himself thoroughly acquainted with the latest production methods.

The factory is run entirely by electricity generated from water power in the French Alps and delivered at a very low price at Lyons. All iron, steel, aluminum and bronze are cast in the factory buildings, and the company makes its own forgings. During the war Berliet produced twenty-five trucks a day, in addition to 250 tanks of the Renault type every month, also shells and machine guns.

New Small-Size Peugeot

PEUGEOT has one of its new models ready, this being a light four-cylinder, four-passenger, evidently designed for cheap production. The selling price was not announced at the show. The engine has its cylinders, 66 by 105 mm., cast with the upper half of the crank-

chamber, and the crankshaft is carried in two ball bearings. Valves are on one side, with a single cap for each pair. The carburetor, a Zenith horizontal, is bolted up direct on the valve side, and exhaust manifold is cast with the cylinders. A single chain, placed at the rear, drives the camshaft and the magneto and electric generator shaft, and provision is provided for taking up slack by means of an idler pinion mounted eccentrically, with a lever on the outside of the casing for moving it and locking it in position. The electric generator is just ahead of the timing gear housing, and the magneto on the same shaft as the generator. The electric starting motor is placed down on the right-hand side of the engine.

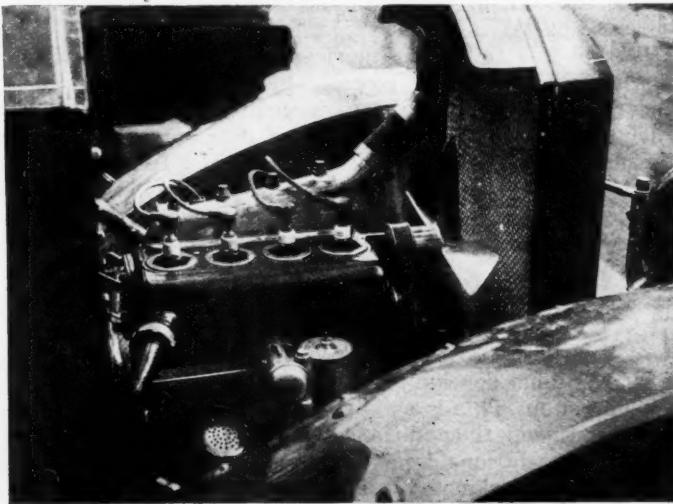
This engine forms a unit construction with the clutch and gearset, the former being disk type and the latter giving four speeds and reverse, with center control. Steering is on the left side, and is of worm-and-nut type.

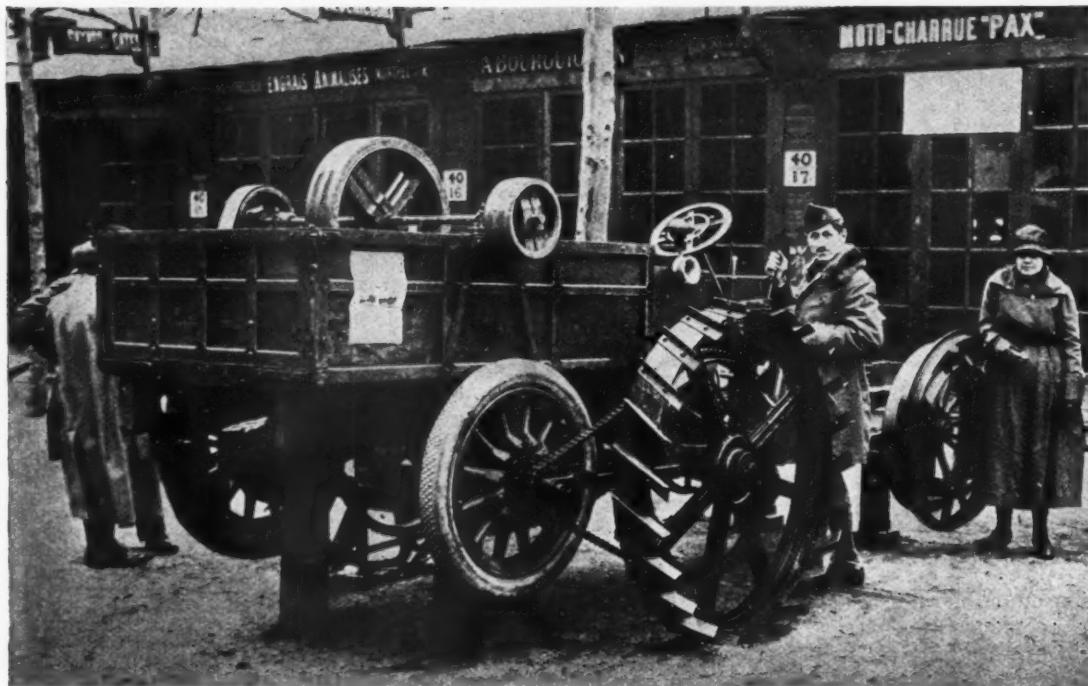
Engine cooling is by thermo-syphon, with the fan driven by belt off the crankshaft.

It is not known whether the French S.E.V. lighting set or the American Bijur will be used. Peugeot has adopted final drive by means of underneath worm, the final gear ratio being 4.6 to 1, with which the car has a speed of 36 m.p.h. Cantilever suspension is fitted at the rear with semi-elliptic in front.



Both sides of the new Peugeot four-cylinder engine, which has a ball-bearing crankshaft. Note the mounting and arrangement of the magneto and starting motor and the location of the carburetor





A French method of converting a touring car or light truck into a farm tractor. This is the Pax

Wheels are wood detachable with 710 by 90 mm. tires. Weight of this car, with four-passenger body, top, wind screen and all accessories, is 1670 lb. Gas consumption is stated to be 24 to 25 miles to the American gallon. Peugeot will market this car with six standard color schemes. Tread is 47 in., wheelbase 98 in. and body space 86 in. in length.

Peugeot Has Ten Factories

Peugeot will also get into big production at an early date. This company is now running ten distinct factories. At Beaulieu it has two factories for bicycles, motorcycles and light cars; at Mandeuile it will build bodies only; passenger cars will be built at the Audincourt factory; at Sochaux two factories will be devoted to trucks, agricultural tractors, and steel, iron, bronze and aluminum castings; all the forges are at Montbeliard; at Lille there is a special factory equipped for bolts and nuts and general turning; at Issy-les-Moulineaux, near Paris, the company will produce aviation engines and spare parts; and at Levallois-Perret, near Paris, there will be the central repair establishment and storerooms for spare parts.

Peugeot has followed American construction methods very closely, and quite recently has commissioned Engineer Oliveau to remain permanently in America in order to keep the factory abreast of developments there. During the war Engineer Oliveau was chief technical instructor, detached from the French Army, at the American Motor Transport School No. 1, at Decizes. Previous to that he was engineer with Delahaye.

FIAT'S first post-war model to be offered to the public is a high-class, light car with four-cylinder engine, 65 by 110 mm., developing 23 hp. at its maximum speed of 2800 r.p.m. This is a type of car which it is believed will meet European conditions, where cost of maintenance has to be closely considered. So much more attention has been paid to workmanship and detail finish on the Fiat that it is interesting to know how it will compare in the matter of price with its French rivals. Up to the present Fiat has not made any announcement on price, stating that this cannot be settled until import duties are known.

Technically the Fiat engineers have made several changes.

The use of detachable cylinder heads is new.

Electric generator and starting motor are both cylindrical and carried in cylindrical extensions of the crank-case.

The engine and gearbox form a unit with three-point attachment to the frame, and the housing which carries the clutch and gears also acts as an oil reservoir for the universal.

The rear axle and propeller shaft housing is composed of two steel stampings welded together in a horizontal plane, with a cover plate on the rear of the differential housing, allowing the whole differential and propeller shaft to be withdrawn.

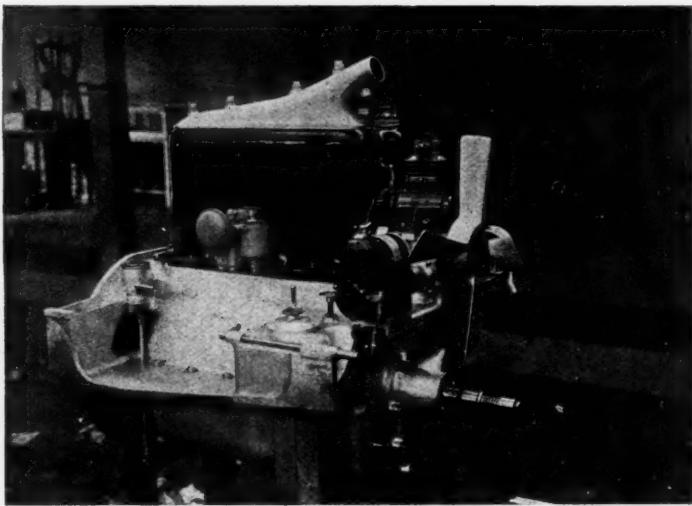
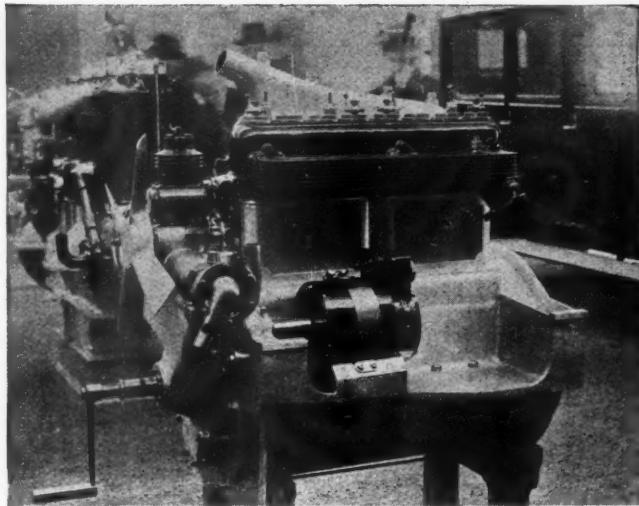
Spiral bevel gears are used.

Two sets of brakes are side by side on the rear wheels, which are detachable steel spoke type.

Pressure fed gasoline has given way to a dashboard



The Fiat agricultural tractor appeared for the first time in France at the Lyons Fair



Both sides of the Cottin-Desgouttes four-cylinder engine. A characteristic is the use of a transverse shaft at the front to drive the water pump, magneto, fan and tire pump

tank. Right-hand steering is maintained, but the change speed and brake levers are inside the body.

Fiat has easily the biggest automobile factory in Europe, with a staff of 40,000 workpeople on the payroll, and a total of 70,000 people dependent on the factory. During the war the factory was producing 100 trucks and passenger cars a day, in addition to aviation motors, guns and special military material. Very close attention has been paid to export business, and production methods have been closely studied. At the present time Fiat has in America a commission composed of one of its chief engineers and five heads of departments. Fiat's program is two fours and two sixes, and although these are going to be high-class jobs, the factory is of such a size that it must produce on a big scale.

CITROEN, as reported in AUTOMOTIVE INDUSTRIES last week, who during the war was one of the biggest shell producers in France, is also putting on the market a light four-cylinder two or four-seater, with an engine of 65 by 110-mm. bore and stroke. The feature of this is the suspension, which consists of an inverted quarter elliptic spring above and one below the axle, these springs taking the drive and the torque. Other builders of light cars, these being two-seaters only, are Sigma and Philos.

France's Cheapest Car

THE cheapest car in the show, and in fact the lowest-priced car ever offered in France, is the A.S.S., offered complete for \$950, with four-passenger body, electric lighting and starting, detachable steel disk wheels and all accessories. On this price it is declared that a reduction of \$20 will be made if orders for 1000 cars are received before the end of March, and a further reduction if 10,000 are ordered before the end of the year.

The company responsible for this car constructed airplanes during the whole of the war, and is now transforming the airplane factory into an automobile establishment. Nothing more than a sheet metal body with four detachable seats was on view, it being declared that the complete chassis would be ready before the closing of the Fair. While there was a reluctance to give many technical details, it was learned that the engine will be a two-cylinder, two-cycle, of 75 by 120 mm. (2.9 by 4.7 in.).

A two-speed epicyclic gear is used and Ford-type steering. Springs are semi-elliptic in front and cantilever at the rear. A very extensive use is made of pressed steel,

for not only the frame members but the two axles are of this construction. Interchangeable steel disk wheels are used with detachable clincher rims and tires of 765 by 105. Wheelbase is 112 in. and tread 56 in. Total weight is 1300 lb., and maximum speed 42 m.p.h., with a declared gasoline consumption of 25 miles to the American gallon. The lighting and starting systems are produced by the maker of the car; the lighting set comprises two headlights with dimmers.

The price of this car is attracting much attention. A two-cycle engine is not looked upon with a great amount of favor, and, as the firm has no past history of importance, it is difficult to judge whether the venture will be a success or not.

Delage has stepped right out of the small and medium-priced car into the exclusive type, with a six-cylinder, 3.1 by 5.9-in. bore and stroke, carrying all modern refinements and fitted with brakes on all four wheels. This is a high-class job and is listed at \$5,700, chassis complete, with five wire wheels and tires, lighting and starting set.

Exhibition of Trucks

IN the truck section of the Lyons Fair not much new material was shown. Renault put on exhibition a 7-ton truck which had been produced to carry tanks. During the war it was desired to carry tanks up to the line aboard trucks, but as it is very rarely that a load of more than 5 tons is carried on one vehicle in France, the only means of moving the tanks was by means of heavy steamers. Renault therefore decided to build a special gasoline truck which would carry a tank, the total load of which is 6½ tons.

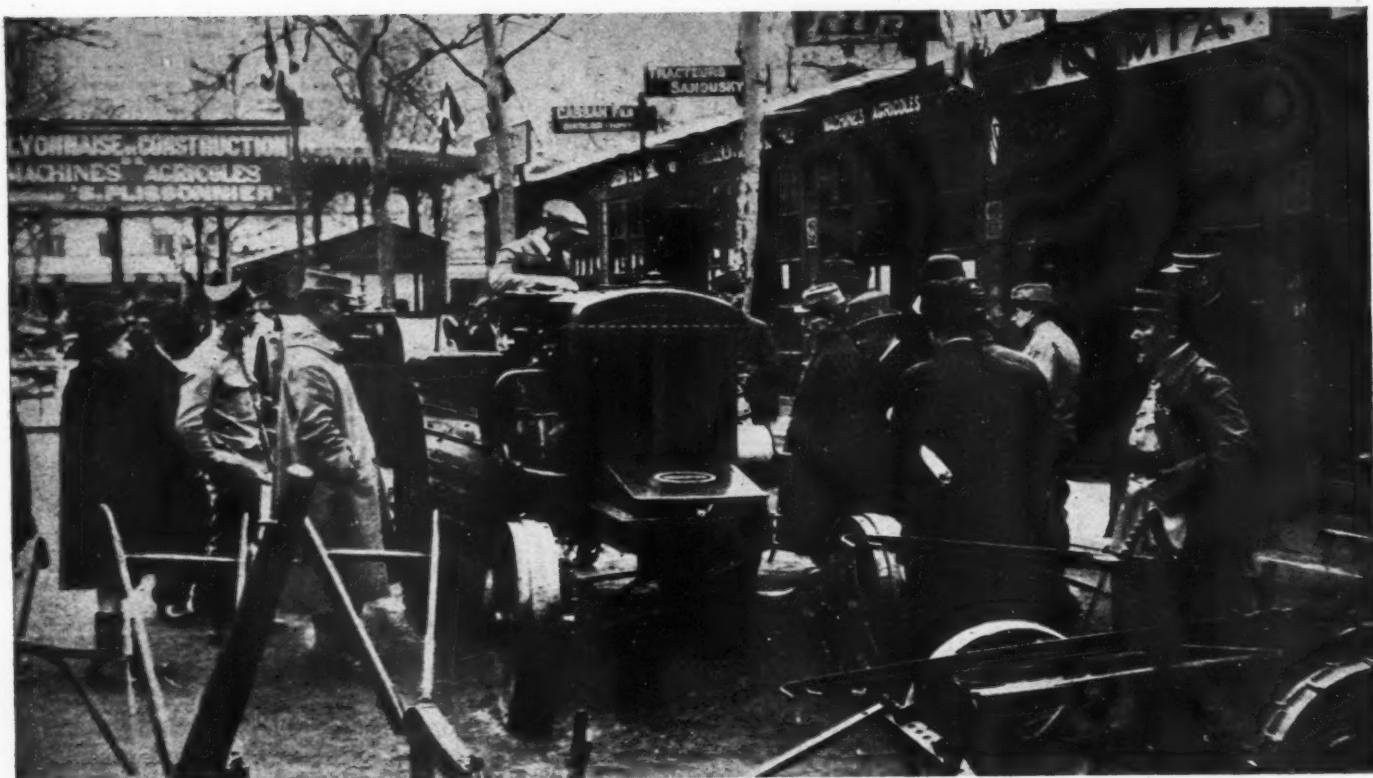
The engine is exactly the same design as that used on smaller trucks, but has a bore and stroke of 5 by 6.3 in. The radiator is back of the engine, inverted V type (the point of the V being toward the rear), and is composed of gilled instead of plain copper tubes. These changes had been made in order to give the bigger radiating surface necessary for an engine of this size.

The only other feature of real interest was the final drive to the rear wheels, this being of the internal-gear type within cast-steel wheels, instead of a double reduction in the axle as on other Renault trucks.

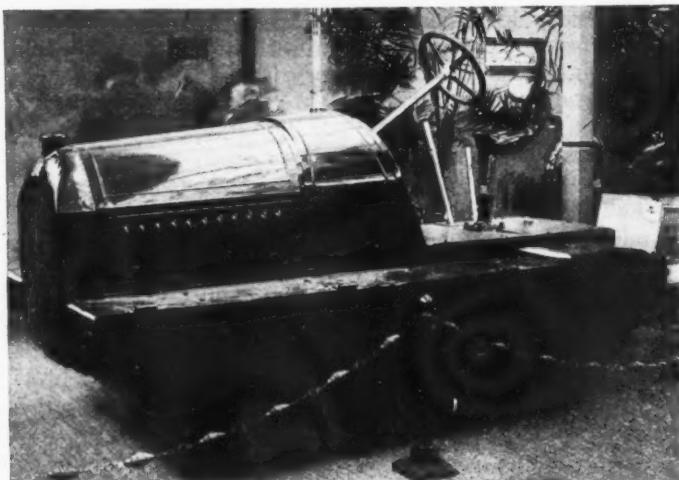
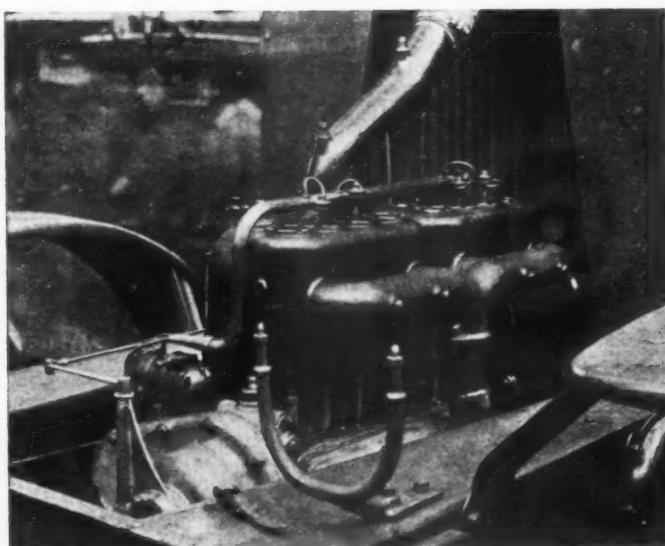
Rear springs were underslung, and had a face width of 6 in.

An extensive use was made of pressed steel for fender brackets, running-board brackets, etc.

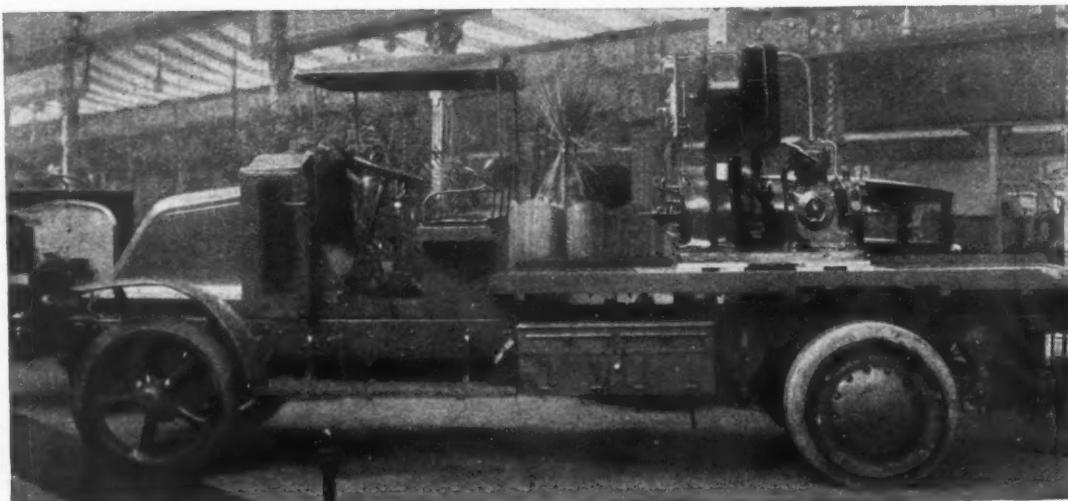
Tires on this truck were 38 by 7, being singles in front



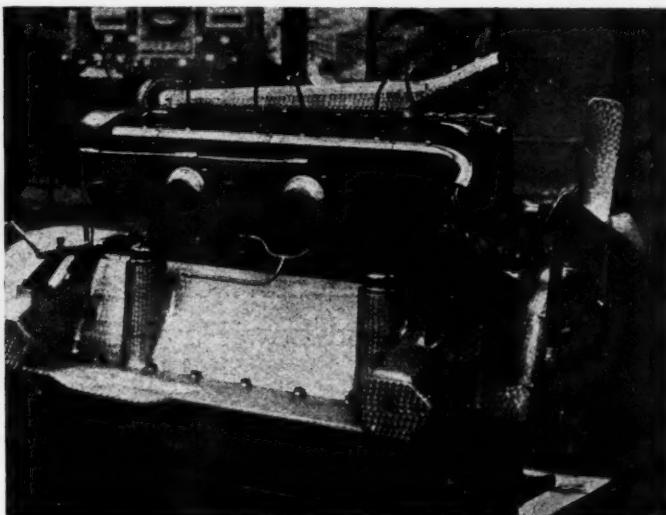
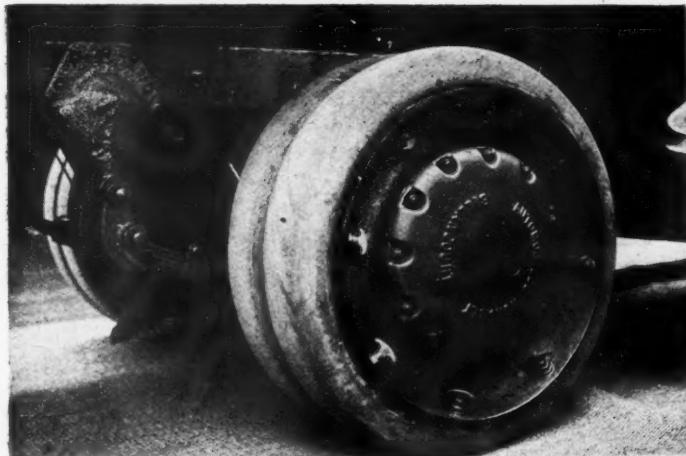
Top—General view of part of the Lyons Fair, with a tractor built by the Paris General Omnibus Co. in the foreground. Below—Peugeot tracklaying tractor



Above—Engine used in the Renault 7-ton truck. Right—Side view of the new Renault 7-ton truck, designed primarily to carry tanks



□ □



Above—Cast-steel wheel used on the internal-gear driven, 7-ton Renault truck. Right—Carburetor side of the Delage six-cylinder engine

and duals at the rear. These are the biggest solid tires seen on a French truck.

Agricultural tractors formed a separate branch of the Fair. The Fiat made its appearance for the first time in France. Other newcomers were the English Austin, which, like the Fiat, has a close resemblance to the Fordson, and the English Alldays & Onions all-purpose tractor.

The Paris General Omnibus Co. showed its own tractor, built under license from the Saunderson company of England. Peugeot put on view a self-track-laying tractor driven by means of a 35-hp. truck engine. This tractor has three speeds and reverse, main clutch control by means of pedal, and steering wheel which gives clutch control for the two tracks.

Renault also announced the production of a self-track-laying tractor, although the vehicle was not on exhibition. Having built tanks for about 2 years, Renault has had considerable experience in this class of construction. His tractor weighs 5900 lb., has a drawbar pull of 4400 lb., and exerts a pressure of 8 lb. per square centimeter. The tractor is listed at \$5,600.

The claim is made by Michelin that the steel disk wheel allows tires to run cooler than the wood type. He states that there is a radiation of heat from the tire to the disk, this being quite noticeable after a long run, when it is found that the outer circumference of the wheel is hot, gradually decreasing in temperature as the center is reached. The Michelin wheel is carried by means of six studs, and is centered by the nuts on these studs. The six holes drilled in the wheel have beveled edges, and the base of the nut is also beveled, thus a wedging effect is obtained which assures a proper centering of the wheel and prevents the nuts working loose. Right-hand thread is used for the right-hand wheels and a left-hand thread for the opposite side. To facilitate fitting the wheels a tubular lever is supplied, this being passed through one of the holes in the wheel and placed on one of the studs, thus enabling the wheel to be levered up into position with a minimum of effort. The brace supplied for tightening the wheel nuts is also designed to fit the end of the jack handle, so as to enable the jack to be operated without bending. The jack is a new production Michelin is about to put on the market.

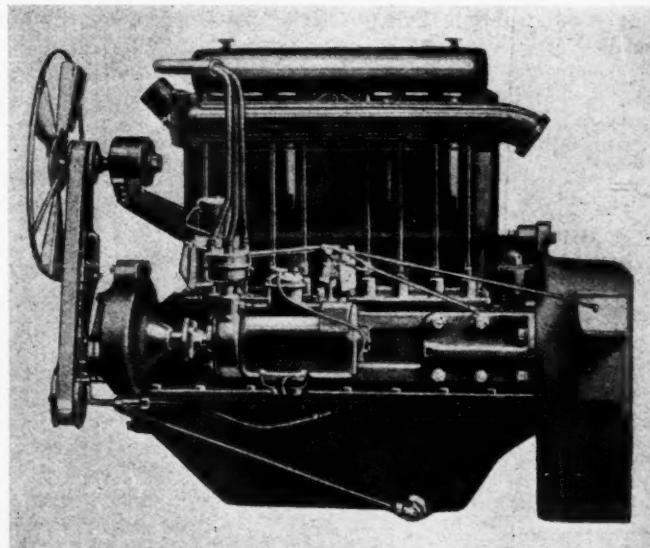
Mathews Four-Cylinder Power Plant

FOR 18 months the Mathews Engineering Co., Sandusky, Ohio, built for the U. S. Government equipment for war service in light houses, wireless stations, on docks, transports, etc. The requirements of the Government having ceased, the Mathews Co. now has placed on the market a four-cylinder engine known as Model F. This is recommended for use on passenger cars, trucks and tractors and for general power purposes in the machine shop, garage, etc. It is a four-cylinder, four-cycle engine of $3\frac{1}{2}$ in. bore by 5 in. stroke, the total piston displacement being 192.4 cu. in. The S. A. E. rating of the engine is 19.6 hp. but the actual brake horsepower runs considerably above this.

The engine is made both in the open type and with a bell housing, the former weighing 400 lb. and the latter 440. It can be furnished with either three or four-point support. If the four-point support is desired, cast steel arms are used.

Lubrication is by the circulating splash system. The pump delivers oil to each of the splash troughs and also to the timing gears. The capacity of the system is 6 qts. All oil leads are external and a float indicator is provided.

While the engine is designed for thermo-syphon cooling and has large water connections, for some classes of work pump circulation may be desired, in which case a centrifugal pump is mounted on the left-side, and is driven from the accessory shaft. The magneto is then driven from the pump shaft.



Mathews engine built for U. S. Government for war service in lighthouses, wireless stations, docks, etc.

Foreign Competition Feared in England

Industry Apprehensive of Return to Old European System of Long Hours and Low Pay—U. S. Greatest Source of Worry

Special London Correspondence

ONE of the sources of fear for British trade on the part of some British motor firms has reference to the possibility of their European competitors returning to the low wages and long working hours which were common in Europe before the war. Belgium is the most cited instance, and certainly the labor conditions there before the war were the worst as compared with France, Germany and Italy, though the last named country was open to improvement on this score compared with France and Germany. The French motor works had a longer working week than the Germans and the rate of pay, though better than the Belgian, was lower than in Germany. The wage conditions in Germany now approximate more nearly to the British, but a longer week is normal, and if the movement toward the 44-hour week in England succeeds—and it is likely that such will be the case in the engineering trades—the discrepancy will be greater and more threatening to our competitive chances.

However, as regards Belgium, the following information may interest your readers, used to big earnings and a proportionately large output. I quote from a recent letter in the *London Times*:

"Previous to the war wages were always low in Belgium as compared with this country, and it was impossible for us to compete with many articles which were turned out in Belgium. The wages paid to skilled men in those times were from 65 to 70 centimes per hour for a good turner or tool maker, whereas a fitter would only get 50 centimes per hour. Girl labor was paid for at 30 centimes and extra efficient girl labor on heavy machines at 45 centimes. A special award of 75 per cent on all wages of mechanics has just been passed to meet the extra cost of living, so that the wages to-day for an ordinary mechanic are 1.25 franc per hour and for a skilled tool and gauge maker 1.50 franc per hour. The wages of the ordinary laborer have been increased to the round figure of 1.00 franc per hour, so that the laborer in a sense is not very far below a mechanic. Girl labor is now fixed at a minimum of 43 centimes per hour and a maximum of 55 centimes per hour."

Let us compare these figures with what we are at present paying in the engineering trades in England. Our very lowest price for skilled labor at present is 10d. (20 cents) per hour, plus 5½d. (11 cents), plus 12½ per cent., which is equal to 1.85 franc per hour.

Our highly skilled labor, *i.e.*, tool and gauge makers, in many cases is paid as high as 1s. 6d. (30 cents) per hour, plus 5½d., plus 12½ per cent, or 2.75 franc per hour.

Ordinary laborers now get 7½d., plus 5½d. (26 cents), plus 12½ per cent, or 1.55 franc per hour. Girls over eighteen get 5½d., plus 4d. (20 cents), equivalent to 1.00 franc per hour. If we compare these figures with those given above for labor in Belgium we shall see the differ-

ence in the cost of labor is from 50 per cent to 80 per cent more.

The British trade unions are well aware of these discrepancies on wage rates and their economical bearing on competition, but their officers point to the recent rapid development of industrial upheaval in these foreign countries as evidence of the trend toward a leveling up of conditions of pay and hours of labor and deduce from it the consolation that it is the knell of the unfair preferential conditions referred to. All of which deduction will be tested and the results demonstrated during the next two or three years. It is curious, however, that so far as concerns competition in the motor trade, there is far more anxiety as to American competition than regarding the combined total of European motor trade competition with British products, and this despite the fact that the rates of wage are much higher in the U. S.

General Instability Reflected in Car Market

The present instability of the motor manufacturing trade is shown by the fact that so many tenders for rough parts are subject to alteration and cancellation because of the further demands of labor for higher pay and the general state of industrial unrest, and it is felt that unless and until there is a substantial price drop in food and other necessities, this instability will continue. Meanwhile precious time is being wasted in getting a start on normal products. Cars of good make are being listed privately at even \$500 premium for early delivery, and in most cases these cars are merely pre-war models made up of materials already in stock when the war started. They are being modernized by being fitted with a dynamo and flywheel, electric starter and minor alterations in detail, but in few cases is there a genuinely new post-war model expected before July. The dealers, too, have to be considered, and as the manufacturers have told them what models they have in hand and the number for which material is available, so they have promised them not to list anything new, particularly appertaining to "popular" cars, until the pre-war stocks have been cleared.

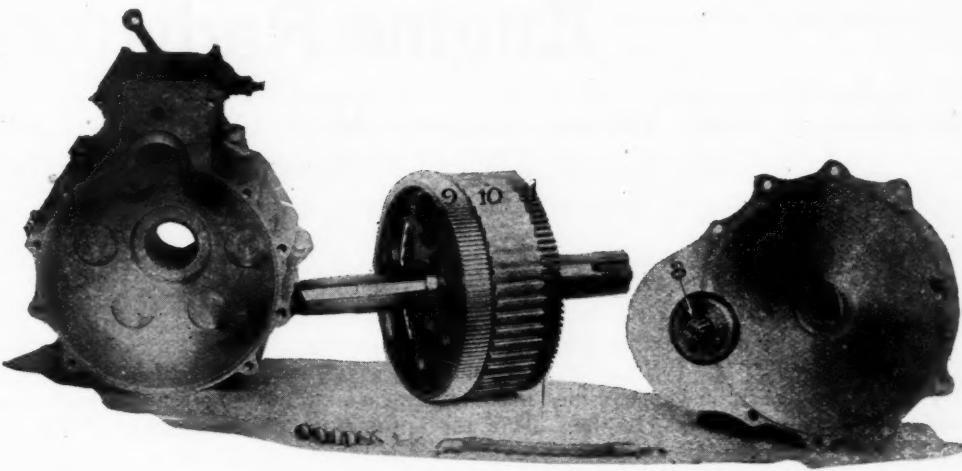
It is reported that a group of French motor chassis makers have combined to pool, as it is called here, when purchasers of raw material. This is apparently the "comptoir" system extended to the motor industry, a system which flourishes over the Continent and in some places is identical with the German Kartel system. If British motor makers were less individualistic, or jealous of one another, as some would express it bluntly, they would pursue a similar policy having regard to the necessary limited scope of many of them.

Ministers continue to be questioned in Parliament as to their intentions in the matter of imports and the present embargo on certain articles, but eliciting statements

(Continued on page 774)

Liberty Starter for Aircraft Engines

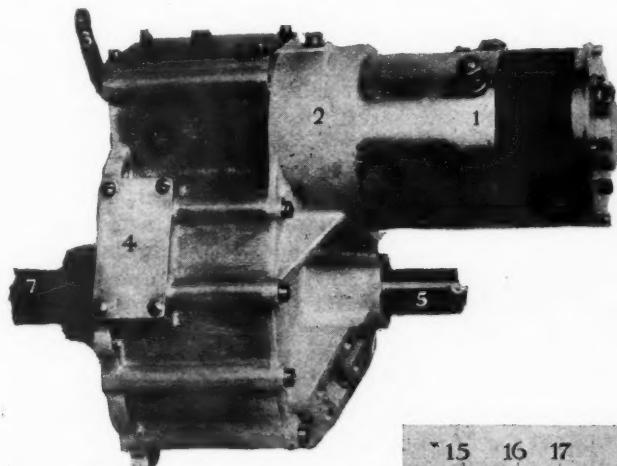
Combines
a Gear Reduction
for Hand
Cranking with
an Electric Starter
with
High Reduction
Ratio



Assembled reduction gear removed from housing

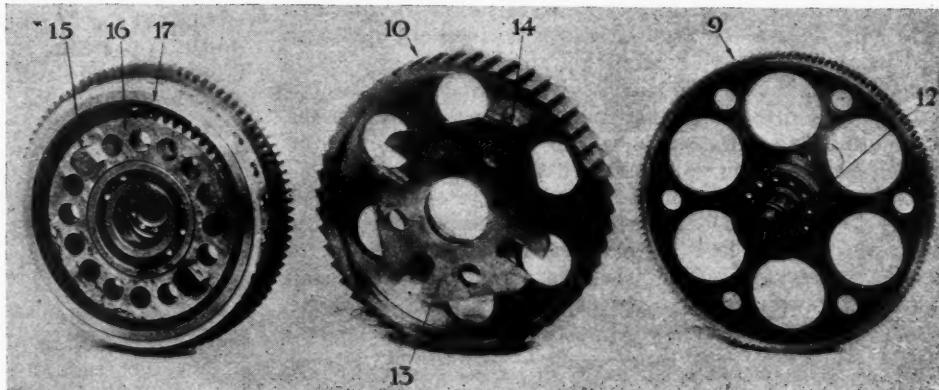
A NUMBER of features of interest are to be found in the new Liberty starter for aircraft engines, which is said to be also adapted to automobile engines. This starter was submitted to the Bureau of Steam Engineering of the Navy Department at Washington some months ago, and we understand that it passed all preliminary tests satisfactorily. As a result, the Navy placed an order for a number of starters which were delivered.

This starter forms a single compact unit, which combines both a hand starting gear reduction and the electric starter. The device aligns directly with the crankshaft on the engine, hence throws no extra strain upon the engine bearings, and the starting unit is practically a part of the crankcase. As



Liberty starter with reduction gear assembled

1, electric starting motor; 2, gear reduction housing; 3, switch lever; 4, plate covering opening over end of crankshaft; 5, starting ratchet; 6, pads for mounting a bevel gear bracket if the starting crank is to extend at right angles; 7, shaft which is coupled to crankshaft by means of external splines; 8, on armature shaft of starter which meshes with gear; 10, ratchet wheel; 11, gear for driving accessories; 12, eccentric on hand cranking shaft; 13, universal plate; 14 and 15, studs on ratchet wheel and eccentric gear respectively, which engage with the universal plate 13; 16, eccentric gear; 17, internal gear



Parts of the reduction gear

it is mounted on the end of the crankshaft (opposite the propeller end), the head resistance is reduced, and the need for radiators of unusual shape is obviated. This starter with hand cranking attachment is said to weigh about one-third less than a separate hand and an electric starter together.

A factory is now building for the Liberty Starters Corp. in Poughkeepsie, N. Y., and when this is completed the manufacture of starters for the Navy and Army, as well as for export, will be continued. It is believed that as airplanes come into civilian use starters will be found just as necessary as on motor cars. Starting an airplane engine, however, has proven to be a much more difficult problem, because the latter has no flywheel, and the starter therefore must be attached directly to the crankshaft. In the Liberty starter, a double reduction gear is used, giving a reduction of 21:1 for hand starting and 240:1 for electric starting. An eccentric is used in order to obtain this high reduction ratio in a compact space. The Liberty starter weighs less than 29 lb. and is said to be capable of developing a starting torque of nearly 2000 lb.-ft. on the crankshaft.

The starter is entirely self-contained, and when it has performed its function as a starting device, it acts as a small flywheel, avoiding the necessity of meshing and unmeshing gears or engaging clutches. Provision is made on the starter case for the attachment of synchronizing gears, a generator or starting magneto (in case the engine is fitted only with magneto ignition). By the attachment of the generator, current can be supplied for recharging the starting battery as well as for lighting and wireless service.

The Principles of Cooling of Airplane Engine Radiators

Amount of Heat Which Radiator Must Dissipate—Law of Heat Transmission from a Surface to a Fluid Flowing Over the Surface—Horsepower Expended in Overcoming Head Resistance of Radiator

By H. B. Irving, B. Sc., A. F. Ae. S.

WITH the advent of the airship and airplane the problem of the cylinder cooling of light weight internal combustion engines has taken on a new and more complex aspect. In the case of the automobile the main consideration is simply to provide for the requisite amount of cooling of the cylinders; the questions of weight and head resistance do not, as they do in the case of the airplane, assume any very great importance. In the case of the automobile, too, the question as to the relative advantages or disadvantages of air cooling over water cooling is now scarcely ever considered, and water cooling is generally adopted as being the only practicable method. The relatively high speed at which an airplane moves, as compared with the speed of most automobiles, makes it necessary for the feasibility of air cooling, even in the case of the largest engines, to be reconsidered.

Cylinder Dimensions of Aero Engines Increasing

During the past few years the power and cylinder dimensions of air-cooled aero engines have been steadily increasing. With engines of moderate power there does not appear to be any very decided preference for either one or the other type. On the one hand, the air-cooled engine is generally lighter than the water-cooled engine, but, on the other hand, it usually is not so economical in running as to fuel and oil,* and, therefore, has to carry a greater weight of these for a given radius of action. In addition, the water-cooled engine probably scores on the whole on the point of reliability. When one comes to really large power units, however, there does not appear to be any doubt but that the water-cooled engine holds the field. The present article is chiefly concerned with the principles governing the design of radiators for water-cooled engines, but these principles apply to a certain extent also to air-cooled engines.

The question which arises at the outset is: How much cooling will the radiator have to perform? or at what rate will heat have to be dissipated for a given engine?

Now, all internal combustion engines as at present constituted, if they are to run satisfactorily and not give trouble due to overheating, must dissipate heat at a certain minimum rate. This rate of cooling is for water-cooled engines generally referred to as the "jacket loss," and does not include the heat lost in the exhaust gases. Many tests have been carried out in order to determine both its amount and its manner of dependence on the various factors involved, such as strength of explosive mixture, revolutions of engine, compression ratio, etc. In the case of most aero engines the following simple rule

*While this statement is absolutely correct, we believe that it is susceptible to the wrong interpretation that air cooling tends to decrease the fuel and oil economy. We believe it should be pointed out that the high fuel and oil consumption of most air-cooled aero engines is due to the fact that these engines are rotary engines.—Editor.

is probably quite sufficiently accurate for the purpose of radiator design:

The "jacket loss" is equal to the heat equivalent of the b.h.p. developed by the engine.

If the engine is enclosed so that heat loss by convection and radiation from the various engine surfaces is small, then practically all the heat equivalent of the b.h.p. of the engine is contained in the water leaving the cylinder jacket and has to be dissipated by the radiator. On the other hand, however, if, as is often the case in airplanes, the engine is exposed to more or less strong currents or eddies of air, a considerable proportion of the total amount of cooling required is done by the cylinder jacket and other surfaces of the engine, thus leaving much less cooling to be done by the radiator. The amount of this auxiliary cooling for a given engine will depend upon the disposition of the engine relative to the airplane, and upon the speed of the airplane. The data available at present are only sufficient to allow of a very rough estimate as to its magnitude, and further information on this point is much to be desired. Valuable data might be obtained from test flights at constant speed with engine at full power, observations being taken of the inlet and outlet water temperatures and engine revolutions. From block test results the jacket loss corresponding to the revolutions (at full power) could be obtained and compared with the amount of cooling done by the radiator. The difference would then give the auxiliary cooling of the engine parts at the air speed at which the test was carried out. This again might be compared with the auxiliary cooling obtained with the engine placed on a test stand in a current of air produced by a fan.

Laws of Heat Transmission

From the foregoing it would at first sight seem to be advantageous to leave the engine exposed to the wind as much as possible, so as to reduce the cooling required to be done by the radiator to as small an amount as possible and so to save weight by needing only a small radiator. But here the question of resistance comes in, and it has to be decided whether the extra resistance incurred by not enclosing or fairing off the engine does not counterbalance the saving in weight and resistance due to the smaller radiator.

Before going into the cooling of the radiator as a whole, it will be as well to consider the general laws of heat transmission, in so far as they enter into the problem of the cooling of the airplane engine or radiator.

Consider, then, a hot surface over which a gas is flowing with velocity v , and let the difference in temperature between the surface and the gas be θ . The law of heat transmission for such a case was first enunciated by Os-

bourne Reynolds in 1874.* If h is the rate of heat transmission per unit area of surface the law states that

$$h = a\theta + b\varphi v^{n-1}$$

where a and b are constants, φ is the density of the gas, and n is the index of v in the expression for the resistance of the surface. Usually $n = 2$, that is, the resistance varies as v squared, in which case

$$h = a\theta + b\varphi v^2$$

It will be seen that the term $a\theta$ represents the cooling which is obtained when the velocity v of the gas over the surface is zero; it may be called the "convection" term, in distinction from the velocity term $b\varphi v^2$. For a given difference of temperature θ , the "convection" term remains constant with increasing velocity, while the velocity term increases in proportion to the velocity, and it may be assumed that, in the case of the airplane radiator, at air speeds above 20 miles per hour, the "convection" term becomes negligible in comparison with the "velocity" term. The law of heat transmission, as generally applicable to airplane radiators, then becomes

$$h = b\varphi v^2,$$

thus signifying that the rate of heat transmission is proportional to

- (1) The density of the gas
- (2) The velocity of the gas
- (3) The temperature difference between gas and surface.

As a matter of interest, it may be noted in passing that, although to us at the present time it may seem perfectly natural, and, in fact, almost obvious, that the rate of cooling of a hot body should depend on the velocity of the wind blowing past it, only in recent years has the dependence of rate of heat transmission on velocity of gas become generally realized by engineers—if indeed it is generally realized even to-day. As before stated, the law of heat transmission was laid down as early as 1874. But until comparatively recently designers of boilers have used in their calculations empirical formulæ which did not contain any velocity term. It was only as late as 1909 that the late Professor Nicholson of Manchester, increasing the velocity of the flue gases in a Cornish boiler to 330 ft./sec., astonished engineers by obtaining from 8 to 10 times the usual rate of heat transmission.

Radiator Types

Modern airplane radiators are in most cases developments of certain types of motor car radiator. They may be broadly classified as

- (a) Those in which water flows from top to bottom through tubes, the air flowing around or in between the tubes;
- (b) Those in which the air flows through an assembly of horizontal tubes over and around which the circulating water passes. The tanks or containers at the top and bottom of the radiator are generally called the "header" and "well" respectively.

The second type, commonly known as the "honeycomb" type, has come into increasing use for airplane engines in recent years, as it lends itself to being made very light and able to withstand vibration. But in both types, and indeed in practically all modern radiators, the aim is to provide in as small a volume as possible and with the least weight the requisite amount of hot surface, *tangential to the direction of motion of the airplane*, over which the air can flow and carry away heat. The cross-section of the radiator, projected along the direction of motion, is made as small as possible, so as to reduce head resistance to a minimum, the resistance of the radiator then being mainly due to skin friction on the sides of the

radiator tubes. Thus the type of radiator, often found on commercial automobiles, in which the upper and lower tanks are connected by a series of vertical circular tubes, has been modified for aero engine work, the tubes now being made either very thin and flat or of fine streamline section.

Returning now to the consideration of the law of cooling for a hot surface, the law

$$h = b\varphi v\theta$$

will apply to each element of surface of the radiator, but it must be remembered that in an actual radiator the difference of temperature between surface and air will vary from top to bottom and from back to front of the radiator, since the temperature of the water falls as the water travels from top to bottom of the radiator, and since the temperature of the air rises slightly in passing through the radiator. If t is taken to be the difference between the mean of the water inlet and outlet temperatures and the temperature of the outside air, it will not be quite correct to say that the heat dissipated is proportional to t , but it will be very nearly correct. Also, the statement that the heat dissipated varies as φ and as v (t constant) may be expected to apply to the whole radiator as well as to an elementary surface.

General Conclusions

Assuming that the resistance of a radiator varies as the square of the speed (an assumption which will in practically all cases be very near the truth), it is now possible to draw some very important general conclusions from the foregoing law of cooling. If S is the total cooling surface:

Rate of cooling of radiator varies as φSVt

Resistance of radiator varies as φSV^2

or varies as $(\varphi SVt) V/t$

Horsepower expended in cooling varies as $(\varphi SVt) V^2/t$

Now for a given motor at a given altitude—that is to say, at a given air density—the rate of cooling required for a given forward speed of the airplane with the engine all out is constant, and, therefore, φSVt is constant. It follows, then, from the above, that the horsepower expended in cooling a given motor—

(a) Varies inversely as the temperature difference between radiator and air, and

(b) Varies directly as the square of the speed of the air passing through the radiator.

Conclusion (a) means simply that the higher the temperature difference between the radiator and the air, the less the horsepower expended in cooling. From the point of view of efficiency in water cooling, it is unfortunate that the boiling point of water is not higher than it actually is, or that no suitable liquid with a higher boiling point can be found to take the place of water in radiators. Another point in this connection is that in respect of temperature difference air-cooled engines are cooled more efficiently than water-cooled engines.

Conclusion (b) is of far-reaching importance. It places the designer on the horns of a dilemma; he has the choice between a small, light radiator of high resistance placed in free air, and a large, heavy radiator of low resistance, so placed or cowed that the speed of the air through it is low.

The advantages of the small radiator are fairly obvious. Its lightness is reflected in improved rate of climb, and it offers a small target for bullets. The latter of these is purely a war time advantage, and the former will probably be not so important in peace time as it was in war time, when a big rate of climb was of paramount importance. The disadvantage of the small free air radiator lies in its high resistance and consequent reduction of the speed of the airplane; the weight of the big

*Proceedings of the Manchester Literary and Philosophical Society.

low resistance radiator, although reducing rate of climb, scarcely affects the speed of the airplane. If it were not for the entering in of considerations other than those which have just been mentioned, it would appear to be very doubtful whether the advantages of the small free air radiator will outweigh the advantages of the large radiator—especially in peace time, when the demand will probably be for efficiency, and when rate of climb will probably become relatively unimportant.

The adoption of the big low-speed radiator at once involves the problem as to how to obtain a low speed of air through it without the introduction of resistance other than that of the radiator itself. For instance, a common place for a radiator is in the nose of an airplane body, the air passing comparatively slowly through the radiator into the fuselage and out by vents in the side or bottom. Now, the additional resistance due to such a radiator cannot be considered to be only the resistance of the radiator proper, but it must be remembered that if the radiator were placed in the free air position, the nose of the body could be made streamline in shape and the resistance of the body reduced considerably; so that for the comparison of resistances to be just, it must be made between a streamline body with free air radiator and a more or less bluff body with nose radiator. Only experimental data could decide which is the better arrangement.

One method of reducing the speed of the air through a radiator suggests itself. The radiator could be placed in the free air and cowled, so that the areas of entrance or exit are less than the frontal area of the radiator. Here again it is uncertain whether or not the decreased resistance of the radiator due to the lower speed of air through it would be counterbalanced by the resistance which would certainly be added by the cowling itself, and the need for experimental data on this subject is emphasized.

The effect of altitude on the question of cooling is of interest. It is a well known fact that both the density and the temperature of the air decrease with increase in altitude. Also, the power of the engine usually decreases roughly as the density, but, by making special provision the power may be maintained constant up to considerable altitudes. Taking first the case in which the power is supposed to remain constant for all altitudes, suppose an airplane to set out on a climb at optimum climbing speed, the cooling being just adequate at ground level. At the same time as the rate of cooling is being reduced owing to reduction in density of the air, it is being increased owing to the increase in temperature difference between radiator and air. Generally these two effects are roughly equal, and the cooling remains the same. In practice the speed of optimum climb increases with altitude, and the cooling would increase in consequence. In this case, then, if the cooling is adequate at ground level, it is ample at altitudes, and, *à fortiori*, it would be ample if the power of the engine decreased with increase in altitude. In fact, the trouble usually experienced in practice is that there is too much cooling at altitudes, and the modern radiator is often provided with adjustable shutters for preventing—partially or almost completely—flow of air through the radiator. There is sometimes a danger—as for instance, in a prolonged glide at high altitude with engine shut off—that the water in the cooling system will freeze, or that the engine will become so cold that it will not "pick up" when the throttle is opened.

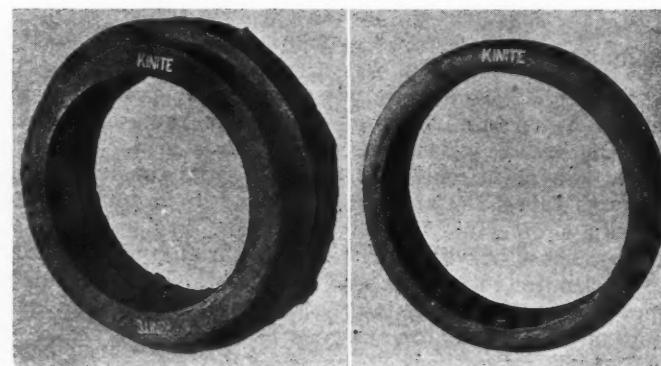
In conclusion, the present article has aimed only at presenting the general principles on which the design and location of radiators should be based. A large amount of experimental work on the subject has been carried out, but owing to the war the results are not yet available for publication. A grasp of the general principles, however, will lead to a ready understanding of the true significance of the data which will no doubt appear in due course.

Kinite—A Tungstenless High-Speed Tool Steel

A TOOL steel that is cast directly into the shape of the tool or die desired and which is claimed to possess the unusual quality of not changing shape or size during hardening, is one of the new developments in the steel industry. This new steel, known as Kinite, is made by the Kinite Co. of Milwaukee, and the following information regarding it is furnished us by the manufacturers:

Kinite is cast in specially prepared molds and has the appearance of a good smooth forging. A peculiar property is that it does not elongate under tensile strain nor decrease in cross-sectional area. It retains the shape and size that is desired until the breaking point is reached. Castings made from it are free from the defects and blow holes usually found in a casting. Unlike all other high speed steels it contains no tungsten. It will harden better than many forged products and when hard is very uniform and close grained, being one of the densest products of the steel family. It is high in heat resisting qualities and does not scale in the fire. These qualities make it an ideal material for making milling cutters, dies, taps and other tools having multiple cutting edges. As Kinite castings do not change their form during the hardening process, it is possible to make them so near the desired shape and size of the finished tool or die that very little machining or labor is necessary for completion. Dies requiring one hole or more are made with the holes cast in, thus saving the purchaser the cost of waste material and the labor of working the holes.

The unusual characteristic of not changing shape or size during hardening makes it possible to produce large dies in one single piece instead of many small pieces where ordinary die steels are used; and also saves from 20 to 70 per cent of the labor necessary to finish such dies after they are cast.



Rough Kinite castings just as they came from the fire

Some of the many kinds of tools that require hardening after finishing and which must retain their original shape and dimensions after hardening are: Blanking, stamping, forming, perforating, drawing and threading dies; plug, surface and snap gages. Kinite is also valuable for making machine parts that must resist heat and wear which are subject to great abrasive action while in service. It has been found that annealing boxes can have much thinner walls when made of this material and that they retain their shape and original weight through many more firings than when cast or malleable iron is used.

Castings made from Kinite can be annealed and rehardened many times without losing any of their properties.



The FORUM

Life of Fabric Disc Universal Joint

By F. R. Blair

IN view of the very general interest and curiosity among members of the engineering profession as to the performance of the so-called "fabric disc" type of universal joint, we believe the inclosed illustration will be of interest to your readers.

It is an un-retouched photograph of a Flexite Disc, one of two used in a coupling between the type B Quartermaster's truck motor and test dynamometer.

This particular disc had run a trifle over 3000 hours of actual service when it was photographed. It will be seen that the holes are round and true, that the fabric is nowhere cut but bears plainly the marks of the buckle plates and distance plates.

The depressions made by the radial teeth of the buckle plates (name given to the heavy plates opposite the spider arms) are approximately 1/32 in. deep, those made by the corrugated spacing plates being somewhat shallower, but in neither case is the surface of the disc in any degree broken.

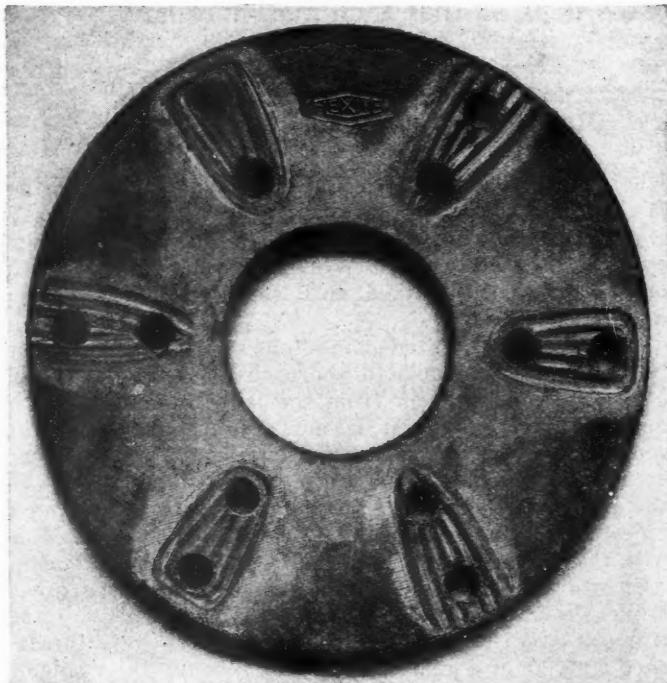
Couplings of this construction in use on the rear propeller shaft of a 5-ton truck have been operated in excess of 20,000 miles in miscellaneous traffic with the discs showing similar condition at the end of that time.

Fuel Economy

By R. M. Gaston

MMR. POMEROY'S engine tests as given on page 432 in the issue of Feb. 20, 1919, permit comparison with American results. His tests are unusually complete in that they cover a wide range of loads at a speed range of 3 to 1. The accompanying curve shows the results of engine B with full size valves. The left-hand vertical scale shows the fuel consumption per brake horsepower hour, while the right-hand vertical scale shows the approximate thermal efficiency.

The curves illustrate clearly the falling off in efficiency at



Universal joint disc dismounted after long use

light loads regardless of the speed. In fact, it is somewhat surprising to find such small differences in efficiency at any particular horsepower output at the various speeds.

The Franklin car can easily cover 40 miles per gallon, and if the distance is covered in two hours, the consumption is only 4 pints per hour. Assuming the tractive effort to average 50 lb. and the mechanical efficiency between the engine and rear tires to be 50 per cent, the horsepower is only 5. The fuel consumption under these conditions is 0.8 pint per horsepower-hour, which corresponds to about 21 per cent thermal efficiency. Mr. Pomeroy's tests do not even approach this as the 5-horsepower efficiency at 800 r.p.m. would be about 1.2 pints per horsepower-hour. The output of the two engines is so similar it would be reasonable to install them on cars of the same size. The Franklin is apparently able to perform the same work on about two-thirds of the fuel.

The mechanical efficiency is taken considerably too low. In fact, tests made by the Franklin company itself have shown that the transmission efficiency on direct drive may be as high as 98 per cent and the rear axle efficiency 96.5 per cent, making the combined efficiency about 95 per cent. While this is the very limit, the transmission efficiency in a car in good condition can never drop to anything like 50 per cent.—Editor.

Auxiliary Motor Trucks

THE Benzwerke Gaggenau supplied to the Spanish War Department at the beginning of the war a number of military trucks, which were designed to go with the mobile motor truck column. These auxiliary vehicles are used for various purposes such as carrying additional fuel for the trucks, portable workshops for field repairs, or the motor trucks themselves in case of a bad breakdown, to prevent them falling into the hands of the enemy. They are driven by four-cylinder gasoline motors, rated at 44-50 hp. The cooling arrangements are made so large that they will keep the engine cool even when running free with the truck standing for a considerable length of time.

The bodies are used for four main purposes. The first is a reservoir truck divided into several compartments, and is made up of riveted sheet-iron tanks. The front part is for oil, and the back part for water, the central part which is much the largest being for the gasoline supply. Suitable gauges enable the driver to see the amount contained of each kind of fuel. Pumps are provided by means of which the fuel, water, or oil can be fed into the tanks through detachable flexible hose pipes.

The second type is fitted up as a store for spare parts which are contained in cupboards and drawers. All requisites even up to spare tires and complete axles are carried.

If the transport truck is so damaged that it is beyond the assistance of the spare-part store, the auxiliary salvage truck comes into service. On the chassis there is a bed with railings on each side which are so arranged that they can be converted into a ramp from the back of the vehicle to the ground, up which the damaged vehicle is hauled by means of a rope windlass provided on the front of the truck. When in position, the damaged truck is held by means of the closed-up railing. If the vehicle is so badly damaged that it cannot be hauled, a revolving crane is erected on bearings which are provided for that purpose, and the damaged wagon is lifted up bodily.

The fourth auxiliary truck is a complete portable workshop which is of the greatest use, not only to the transport service, but also to the air service and other corps. It contains a 6.6 kw. electric dynamo, lathe, drilling machine, milling machine, grinding machine, band saw, forge, anvil, and work benches. The lower parts of the side walls can be opened and fixed in a horizontal position to increase the working floor space, the corresponding upper halves of the walls being folded upwards to extend the roof.

Production Involves Intensive Study of Human Side

Volumes Printed on Industrial Management, but None on the Human Side of Business Affairs

By Harry Tipper

IT is significant as indicating the times in which we live that we should find in a page advertisement in the *New York Times* of March 24 the following paragraphs:

Quotation No. 1

Life was hopeless and miserable enough for most working people in Russia to make them easy victims of Bolshevism. But their revolt is not only against material conditions. It goes deeper than that—it is a great outbreaking of hatred and despair against the industrial system itself, and against all who have helped to make such a system possible.

Quotation No. 2

Rational hours, good wages, a comfortable material environment—these things are necessary, but these things alone will not do it. These are great masses of people whom these things alone will not satisfy today.

Quotation No. 3

The thing they are seeking is a new spirit in industry; a spirit that will recognize and respect the personality of each man, so that each man may have freedom of self-expression through his work.

ANY man who puts together the things which are exhibited in the newspapers and other periodicals, day by day, must be impressed not only with the importance of the labor problem and the necessity for its thorough examination, but also with its imminence and the necessity for action of the right kind; if we are to avoid either the turmoil which is enveloping Continental Europe or the defiance of government and the demand for nationalization which is occupying the attention of Great Britain.

It is significant that back of all the political turmoil about which we are reading and the effects of which we are noting, lies the industrial unrest, and the industrial unrest is the direct outcome of conditions which are humanly unsound and are bound to change.

The tendency of the times is unmistakable. The harbor strike is still going on in the Port of New York, called for the second time because the awards of the first strike were not agreeable to the workers, in spite of the fact that the Government was called in by the workers in the first strike and the decision of the war

labor board was denounced by the owners as favoring the workers too much. It is to be noted in the demand which was made for a strike to begin July 1, on the slogan, "no beer no work." While this suggestion petered out, it was not squashed until some 500,000 workmen had voted for it.

It is not only that demand follows demand and that the employer is unable to approach his labor costs and his production problem from the labor standpoint with any certainty at all; it is not even that Government consideration demanded that capital and management accept decisions to which they did not agree, but it is the general tendency for labor to defy the Government unless the decisions of the Government are agreeable with their demands and with their estimated requirement.

It will be noted that in the last 4 months the great triple alliance of labor in Great Britain, involving the transportation workers and the coal miners, have threatened a strike of a general character through the whole of that country three times because of dissatisfaction with the Government position and with the length of time dur-

ing which the Government has been attempting to arrive at a settlement of the questions involved. It should not pass without attention that the Sankey Report of the proposed settlement of the coal miners' dispute, which has not yet been accepted by the workers because it does not sufficiently establish them, definitely limits the profit per ton which capital can secure and also definitely provides for a combination in the management of the industry by representatives of the workers together with representatives of capital or the owners.

It is necessary to recognize the fact that we do not live in the same world from an organization standpoint that we did in 1914 when the war broke out. It is necessary to emphasize the fact that this conflict has changed the outlook and the ideas of whole peoples to such an extent that it may result in a more severe period of political uncertainty and, perhaps, warfare, unless measures are taken which are founded upon the deep-seated necessities of the human being as an individual and as a part of an organization and not upon the temporary and supposed requirements of a production method.

It has been the boast of this country that we have been able to throw away methods of operation at any time when new methods presented themselves before our industries. We shall be called upon to justify this boast in a larger measure and under more critical circumstances during the next few years than at any time in the history of our development.

No Discussion of Human Nature

ONE SEARCHES IN VAIN THROUGH THE BIBLIOGRAPHY OF INDUSTRIAL PRODUCTION, THROUGH THE BOOKS UPON EMPLOYMENT AND EMPLOYMENT MANAGEMENT, THROUGH THE WORKS UPON MOTION STUDY, EFFICIENCY AND INDUSTRIAL ENGINEERING, FOR ANY VOLUMES WHICH ARE DEVOTED TO A SERIOUS AND THOROUGH DISCUSSION OF THE HUMAN SIDE OF BUSINESS AFFAIRS.

The preacher, the socialist and the labor leader know a great deal more than the business man about the conditions among the workers, about their aspirations and about some of their necessities. It is true that their ideas as to the solution of the matter may be impractical and destructive, but that does not militate against the value of their discussions and their examination of the conditions, the aspiration and the tendency to be observed in this department of industrial affairs.

On account of this lack of study of the place of the individual in the industrial organization and the place of labor as a mass in its relation to management and capital in industrial work, the statements which have been made as to the increase of efficiency, the necessity for specialization, the value of standardization, the importance of this or that method of operation, cannot be regarded as accurate or scientific. If it is true that the whole production system depends for its value upon the action of the individual laborer and that all the mechanical processes are subsidiary to the human factor in the case, IT IS OBVIOUS THAT THE ALMOST TOTAL NEGLECT OF THE HUMAN FACTOR DESTROYS THE VALUE OF THE CONCLUSIONS WHICH HAVE BEEN REACHED AND MAKES IT NECESSARY TO DISREGARD THEM ALMOST ENTIRELY IN ANY PROPER EXAMINATION OF THE SUBJECT.

1—If this means anything, it means that the production manager, the engineer, the general executive, the capitalist must be prepared to throw away all preconceived notions and prejudices which have accumulated through the hundred years' operation of the factory system unless these can be justified by a more logical and

more effective study than they have been given up to the present.

2—It means that they must be prepared to give far more attention to the Socialist, the labor leader, the preacher and the politician than they have been wont to do in the past, because these men have studied the human being more thoroughly and more carefully.

3—It means that the industrial executive and the capitalist must be prepared to examine afresh the real part which is played by capital, by management and by labor in the total necessities of production.

The statement that because the capital has been advanced the capitalist should control will not be permitted to pass unchallenged. In fact, it is being challenged with a greater voice every day, and the tones in which the challenge is spoken becomes less and less uncertain and more defiant. The statement that because management has been empowered by capital to conduct the affairs of industry it must control altogether the conduct of that industry is being challenged in the same way, and the statement of labor, that it forms the bulk of the productive work and that it should control industry deserves to be challenged as it is being challenged by the management and the capitalist.

The New Objective

IF THIS INDUSTRIAL QUESTION IS TO BE SETLED WITHOUT SUCH A PERIOD OF POLITICAL AND INDUSTRIAL UNCERTAINTY AND TURMOIL, AS WE WOULD HESITATE TO DISCUSS, IT WILL BE NECESSARY THAT CAPITAL SHOULD BE WILLING TO TAKE A SMALLER SHARE OF THE PROFIT OF INDUSTRY AND A VERY MUCH SMALLER SHARE IN THE CONDUCT OF INDUSTRY; THAT MANAGEMENT SHOULD EXTEND TO LABOR A SHARE IN THE RESPONSIBILITY FOR THE CONDUCT OF INDUSTRY AND PARTICULARLY A LARGE SHARE IN THE RESPONSIBILITY FOR THE CONDITIONS OF ITS OWN WORK, AND THAT CAPITAL, MANAGEMENT AND LABOR SHOULD ALL THREE SHARE IN THE PROFITS OF INDUSTRY AS WELL AS ITS RESPONSIBILITIES.

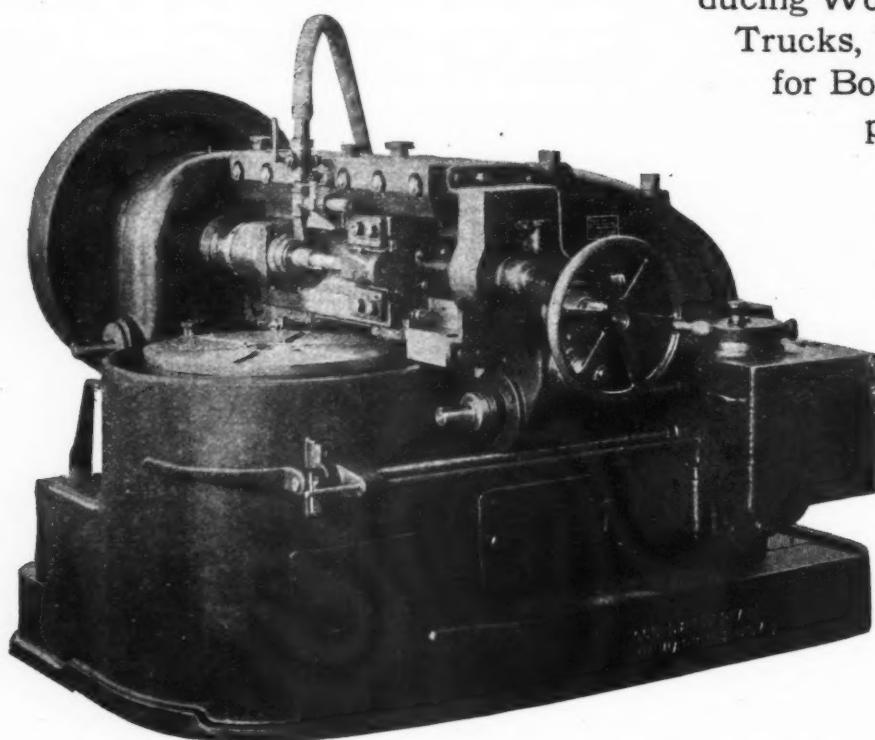
This can be done best by the individual organization arranging matters with its employees. The difficulty of accomplishing this in an orderly way through organized labor and organized groups of manufacturers is being illustrated in Great Britain to-day in the difficulties of arriving at agreement. The ease with which it can be done in the individual organization, provided that it is permeated by the spirit of square dealing, is indicated by the number of organizations of this kind which have been started in the last four years in this country without any turmoil and which are successfully handling the problems as they come up.

This is specifically an indication of the necessity for action, not for mere academic interest or so-called open-mindedness, but the necessity for serious examination and study of the problems and the decision along the best available lines. The final solution cannot be forthcoming at the present time, but the basis for an orderly solution has been provided in a sufficient number of individual cases to make it possible for any manufacturer to discover among these cases something which is applicable to his own plant. These cases should be studied, the fundamental reasons for their operations and the methods of their operation determined and action taken.

In this country we have the opportunity to settle this matter with less trouble on a better basis, with greater promise of progress than in any other country of an industrial character, but to do this it will be necessary for us to act, not merely to think about it.

G & E 18-In. Worm Wheel Generator

New Machine Specially Designed for Producing Worms and Worm Wheels for Trucks, Tractors, Etc—Adapted for Both Production and Experimental Work



G & E worm wheel generator. This illustration brings out strongly the robust construction of the machine

THE rapid increase in the manufacture of worms and worm wheels for use in motor trucks, tractors, elevators and worm gear reduction sets has created a demand for machines designed especially for this class of work. Such a machine is the automatic worm gear generator manufactured by Gould & Eberhard, Newark, N. J. It will automatically generate worm wheels with a tapered hob having a tangential feed or with a straight hob, which is fed into the worm wheel and not across it, and has means for cutting worm wheels with a fly tool. The latter method is particularly useful when carrying on a series of experiments, when it would be costly to make up special hobs for every wheel.

The success of worm and worm-wheel drives depends largely upon the accuracy and smoothness with which the worms and worm wheels are cut. The machine, to cut the worm wheels of the required quality must be unusually substantial; it must comprise the least number of parts, to eliminate torsional strains and to obtain the greatest amount of production from the hobs before grinding becomes necessary.

Worm-wheel hobs, by reason of their design, cannot be ground back as far as ordinary hobs, with the result that it is highly important that the machines in which hobs are used be of such substantial proportion that the hobs will cut the greatest number of worm wheels before getting dull.

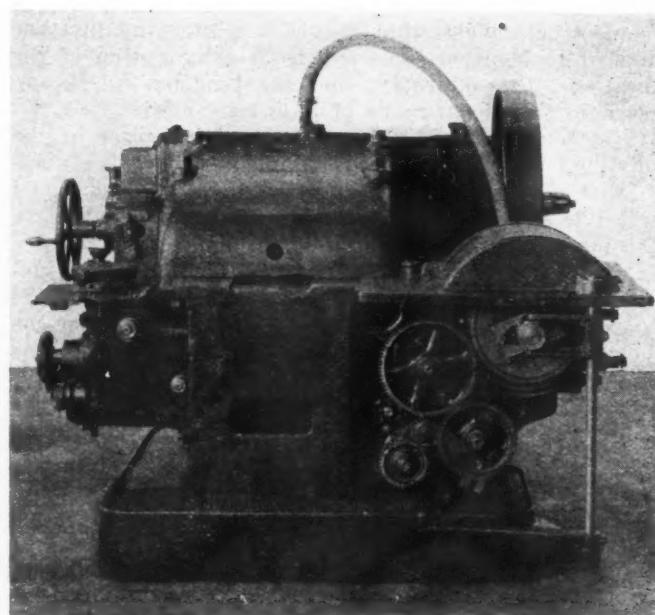
The cutter spindle drive is through a powerful worm and worm wheel, with a large flywheel mounted directly on the end of the cutter spindle. It is also important that the work table be of substantial design and powerfully driven, so that it will be rigid under heavy strains. To insure this rigidity, the table is mounted in a permanent bearing in the base, while the cutter or hob carriage is mounted on a horizontal adjustable stanchion. This permits the work table to be arranged with a long cylindrical hub bearing, in addition to a

conical and flat bearing and an indexing worm wheel of large diameter, which could not be incorporated if the work table was mounted in an adjustable carriage.

It is essential that the work table or face place be of convenient height for loading and unloading, and consideration has been given to this in the arrangement of the machine. All running parts are readily accessible and all necessary operating levers are conveniently located at the front of the machine, giving the operator full and instant control.

The machine is driven with a single pulley, and a high-speed clutch is incorporated so that it may be started or stopped instantly. This is operated by a lever at the front of the machine. There are six changes of cutter speeds, ranging from 58 to 183 r.p.m., making it possible to run various diameter hobs at the proper speed for the material being cut.

It is essential in a machine of this type to have a differential mechanism to enable the operator to take a second cut through a worm wheel, when using a tapered hob or fly tool, without losing the lead. The differential mechanism is also an advantage because it permits of changing the feed without changing the lead gears. When using a straight



Rear view of the worm wheel generator showing belt pulley, clutch and gearing for changing cutter speeds

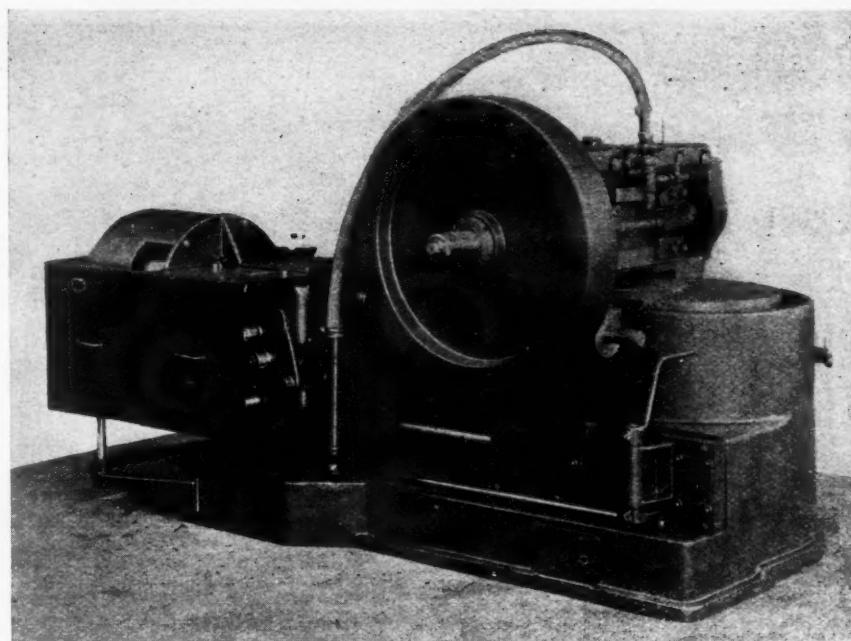
hob with automatic infeed, the differential is not required, and convenient means are provided for locking it.

A portable cutter arbor is furnished. The cutter carriage has an automatic tangential feed in one direction, and power return. An automatic stopping device is also provided, and may be set so as to stop the cutter carriage at any predetermined point. A graduated dial on the stopping device allows the operator to set the stopping mechanism to stop the cutter carriage at any predetermined point.

The stanchion is provided with automatic infeed and power return. When feeding automatically into the revolving worm-wheel blank an automatic stop is provided, which is equipped with a graduated dial so that the operator can set the mechanism to stop at any predetermined point. When the tangential feed is being used, the stanchion is adjusted to the proper depth of tooth and then securely bolted to the base of the machine by four bolts. In adjusting the stanchion by hand, a dial graduated in thousandths of an inch is furnished, in addition to a scale and vernier, to set the hob and worm-wheel blank at the required center distance.

A centrifugal pump is regularly furnished with each machine to allow the use of a coolant, when cutting steel or bronze. It is attached to one side of the machine and is driven by gears. It may be conveniently disconnected by means of a clutch.

The machine will cut worm wheels up to 18 in. diameter; it will cut worm wheels with any number of teeth from 10 to 100 and with numbers of teeth from 102 to 120 except prime numbers. The cutting is done with hobs of one to five threads. A hob up to 5½ in. diameter can be swung and the length of hob may be anything up to 8 in. The cutter slide has a tangential travel of 10 in. The center distance from the cutter to the work spindle is limited to 3 in. minimum and 13½ in. maximum. The center of the cutter arbor, which arbor is 1¼ in. in diameter, is located 7 in. above the top of the face plate. The net weight of the machine is 8600 lb.



Side view of generator, showing flywheel on cutter arbor, hose connection for coolant, etc.

supported in bearings bolted to the front cross member of the tractor frame. At the forward end the tubular arm carries a pair of disk wheels running in the furrow. An upright of angle iron is secured to the arm at its bend and connects to a lever in front of the operator's seat, thus furnishing a means of lifting the guide when the tractor is to be turned at the end of the field.

The obvious advantage of a device of this kind is, of course, that the driver does not need to pay any attention to the steering, except in turning at the ends of the field, and is free to watch his plows. An indirect advantage is also claimed, namely, that with the guide the tractor can be run closer to the furrow than would be possible with hand-steering, and as a result the side draft can be reduced. While the guide is applicable to creeper type tractors generally, it seems to have been designed specially for the Cleveland, to which it can be fitted without drilling any holes. The runners are adjustable for 12 and 14 in. furrows. When not required the guide can be taken off in 10 min., it is claimed.

Improving the Climbing Rate of Airplanes

WRITING in the *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, H. von Burberg states that when the wings of an aeroplane are being covered the fabric on the lower surface is sprinkled lightly with sand. Although the friction is thereby increased, the climbing power is considerably improved. This result is associated with the production of innumerable small eddies all in close proximity to each other on the undersurface of the wing, forming a species of air cushion. A fact closely associated with this is the phenomenon that when a machine flies directly into a head wind it climbs better than when flying in still air with the same relative speed. The author considers that this effect is directly connected with the eddying air encountered by the machine.

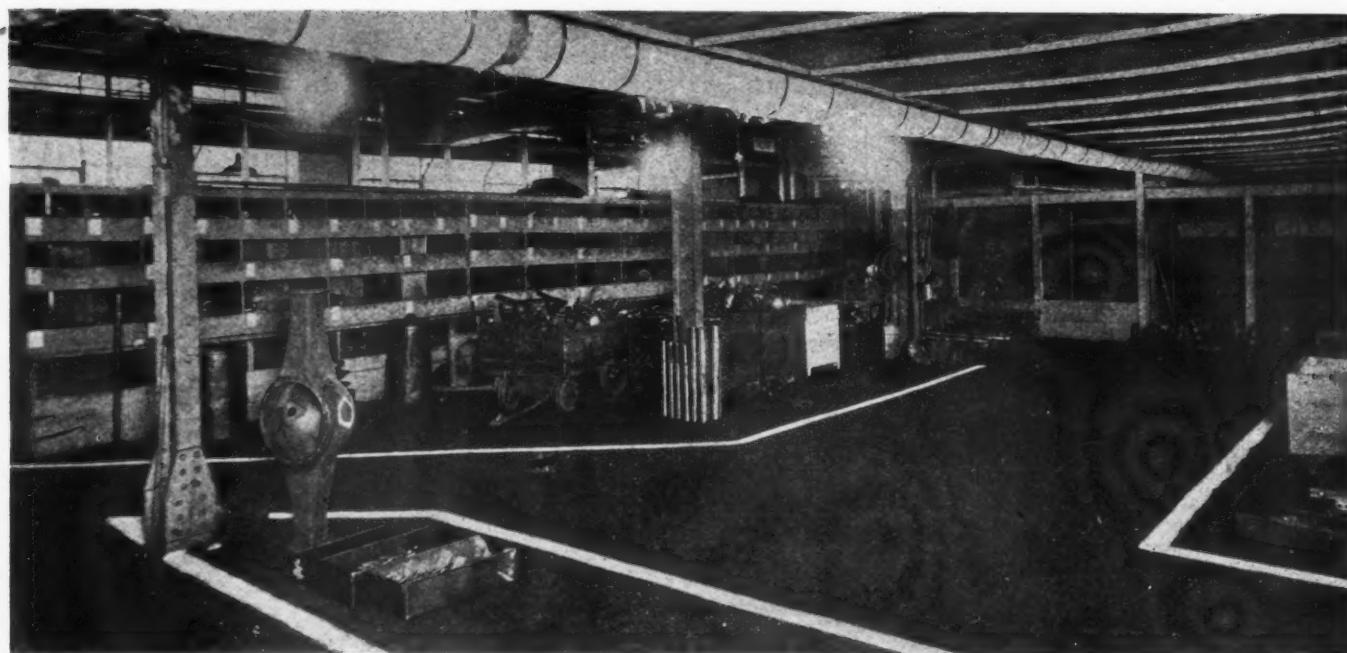
Experiments are being conducted to test the effects of roughening different parts of the surface of propellers and streamline bodies, and these have so far given satisfactory results. They have shown that roughening the under-surface of the wing is favorable to the production of a cushion of supporting eddies.

Willis Tractor Guide

A SELF-STEERING attachment for creeper type tractors is being marketed by the Willis-Flack Mfg. Co., Kansas City, Mo. It consists essentially of a forwardly extending tubular arm. The rear end of this arm is bent at right angles and is



Application of the Willis Tractor Guide



Incoming parts and material are delivered either by train, motor truck, or trailer. The trailer comes from the Timken forging shop and is pulled by a gasoline tractor designed for this heavy haul work

Timken Solving Production Problem

Efficiently Operated Electric Trucks for Interdepartmental Transportation Reduced Truckers by 50 Per Cent—Use Elevated Containers

By J. Edward Schipper

Part II

OWING to the necessity for scattering the departments throughout the gradually erected buildings of the Timken-Detroit Axle Co., it is of great importance that interdepartmental communication be maintained at high efficiency wherever it is necessary that such communication exist.

For example, between the material and the manufacturing departments there must be quick and good transportation of materials to the manufacturing department.

There must be rapid and good transportation of the incoming raw stock to the material stockroom.

The Timken factory has grown gradually, and it has been necessary to add buildings after buildings, until now there are approximately ninety buildings devoted to the business. In the particular series of fifty-seven buildings we are discussing, only motor truck axles are manufactured, with the ex-

ception of the Cadillac passenger car axles. Another group of buildings handles the passenger car production; another section produces the forgings. A certain amount of special work is purchased outside, although this is confined to very few products.

Visualizing these conditions, it is easy to see, in manufacturing the Cadillac-Timken axle, which perhaps is made in fifteen buildings, how vital it is that the movement of these parts—from raw stock to manufacture, from manufacture to heat-treatment, from heat-treatment to finishing operations, and from finishing operations to finished stock, and thence to assembly and shipping—be judiciously handled if the work is to go through smoothly. Consequently, interdepartmental transportation has been given a great amount of attention. Recently a new system has been introduced which has reduced the number of men han-



At the end of each month the night and day foremen of the cleanest department have their names inscribed on the shell, and this is kept in that department for a month

dling the work from ninety-eight to fifty-four. This will be cut still further by completing the electric truck equipment now in use.

To accomplish this, standard boxes and racks, mounted on castors, are used. When one of these boxes is filled it can be pushed aside and an empty one introduced. The electric trucks are continuously on the move, picking up the filled boxes and carrying them to points where needed. This may be from the manufacturing department to the heat-treating room, or it may be to convey a load of forgings from the receiving room to the knuckle department. The boxes are quickly picked up by the electric truck, which has a platform lower than the space beneath the box.

The driver soon becomes expert in running the truck beneath the box, turning on the elevating electric motor, which raises the platform and lifts the box off the floor. The trucks are capable of traveling 7 to 14 m.p.h. They are equipped with electric horns, which allow them to proceed with high speed and safety, down the aisles.

Naturally, with high-speed transportation between the departments it is necessary to keep the aisle space clear, which is done by vividly outlining them with white lines. It is made a special matter of duty to keep the aisle spaces clear, because obstructions in them would mean delay in transportation. It is estimated that since the introduction of the electric industrial truck, with the standard boxes and containers, and the clearing of the aisle spaces, transportation efficiency has gone up 400 per cent. Working on the regular schedule, the electric trucks travel over their routes.

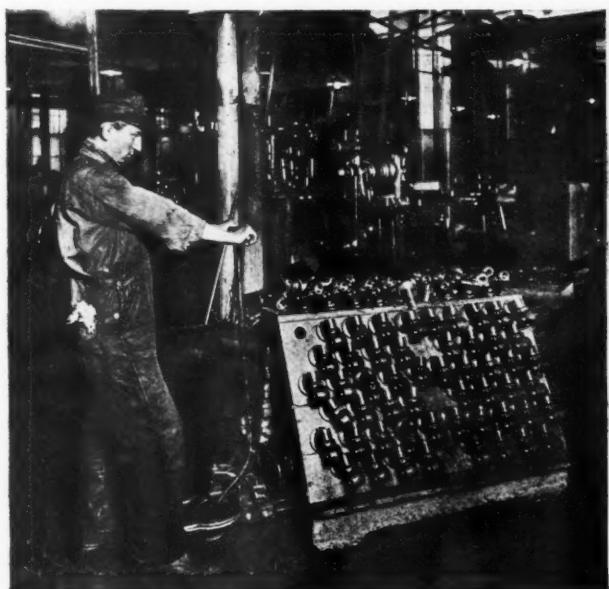
An observation in the raw material department indicated that an electric truck left every 10 min. loaded with a box of materials. Only 25 sec. elapsed from the time



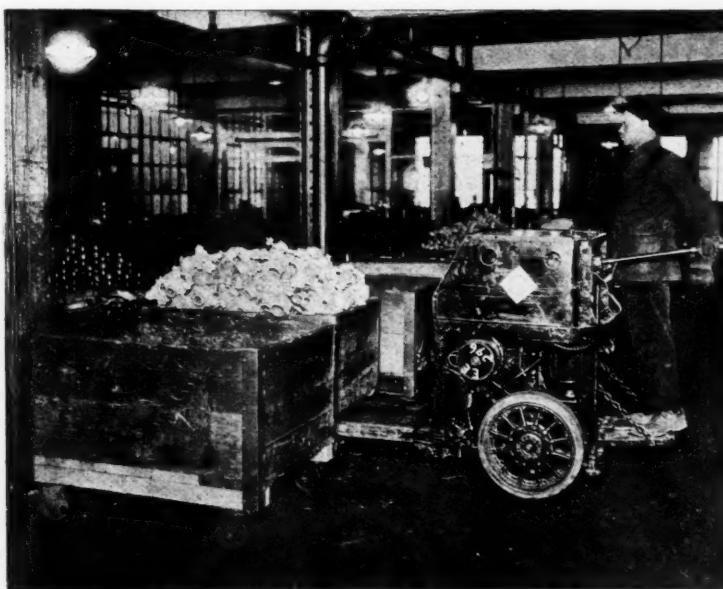
Carrier department, showing carriers for various types of axles all going through the same department

the electric truck arrived in the department until it had slipped its platform under the box, raised the box off the floor and started on its trip. Boxes of all the required materials are always waiting in the raw materials department, so that no delay exists at this point. An electric truck never has to stand and wait while a box is being filled. When it arrives in the department it travels up the aisle to the box it wants, slips its platform under it, the elevating motor is turned on, and in a few seconds it is off with its load to the department requiring that material.

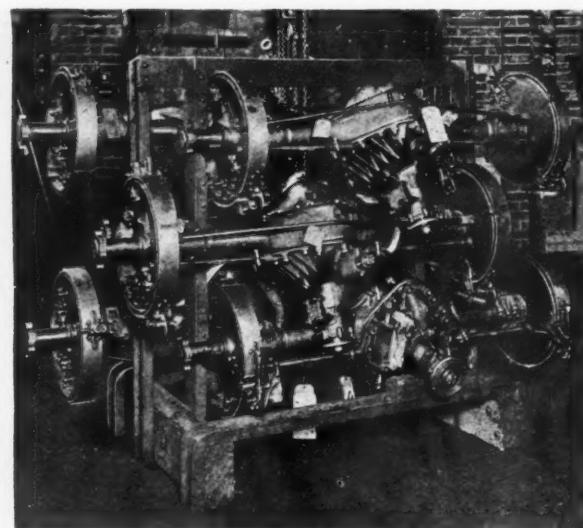
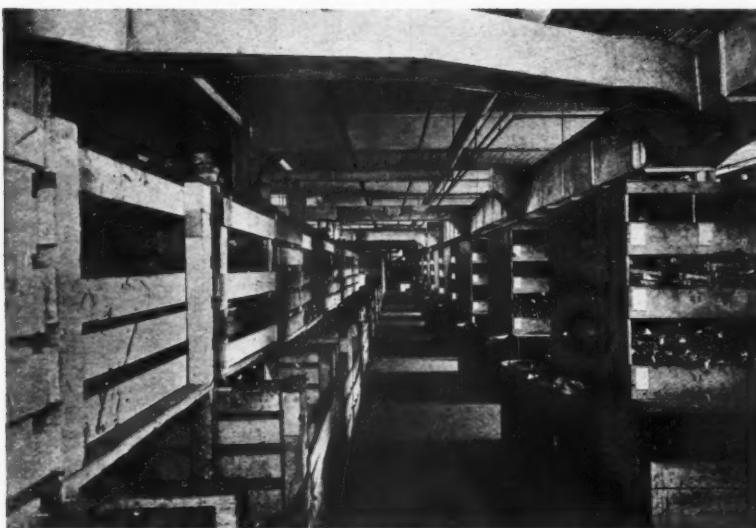
Realizing the importance of a clear aisle space, it has been made a matter of pride with the different departments to present the cleanest possible aspect, with ma-



Electric truck slipping its platform beneath a loaded box of parts



Racks of parts can be moved around the department by means of hand trucks which elevate the racks



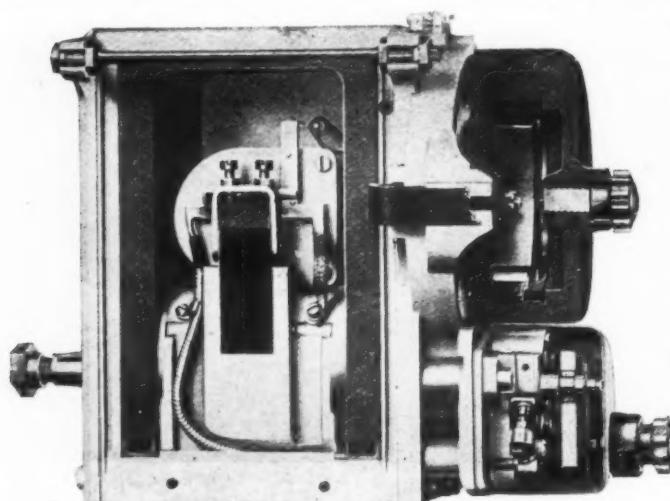
Left—Type of bins which clear aisle spaces for finished stock. Right—Back of finished axles. Note how rack is constructed so that electric truck platform will fit underneath, allowing for quick transportation

terials neatly arranged in racks or in some instances in piles, with nothing protruding into the aisle spaces. During the month an inspection record of departments is kept, and the one which has been cleanest is given a mark of recognition in the form of a shell, with the names of the night and day foremen engraved upon it. This shell is kept in a glass case mounted on a stand, and remains in the department for the month following that in which it was won.

New Dixie Automobile Magneto

A NEW series of magnetos for passenger cars and motor trucks, referred to as aero magnetos, has been placed on the market by the Splittorf Electrical Co., Newark, N. J. The most apparent change from the former series is that the finish, instead of being black, is khaki. A single square carbon brush is used, heavier interrupter points, and more rugged construction throughout. The magneto is unidirectional. Micarta gears are employed, and the distributor block is made of Americanite. The Mason inductor principle, embodying the use of stationary windings and revolving fields, is adhered to.

The unidirectional principle may be explained as follows: Like practically all other ignition magnetos, the Dixie magneto generates an alternating current, comprising both a positive and a negative wave. It has been found in experiments with such magnetos that one of the waves is always stronger



Part-sectional view of Dixie aero-type automobile magneto

than the other, and in the aero-type magneto the negative wave is the stronger. The aero magneto is so designed that only negative waves are used for producing the sparks. The cam of the interrupter has two lobes, and the revolving field, or rotor, has four wings. When the rotor wings on the distributor end of the magneto leave the poles, the cam separates the platinum points. At this moment a spark is produced. When the rotor wings on the drive end of the magneto leave the poles, the cam holds the platinum points apart, with the result that no spark is produced. This explanation applies directly to a magneto designed for right-hand operation. In a left-hand type magneto the cam opens the platinum point when the rotor wings on the drive end leave the poles. In this case the position of the magneto is reversed, and the spark therefore is of the same polarity as with a right-hand driven type.

Substitutes for Platinum

THE chief source of platinum is Russia, and since the revolution in that country the stocks of platinum in allied countries have been much depleted. Platinum owes its uses largely to its high melting temperature and to its resistance to attack by acids. It is extensively used for crucibles and for electric spark terminals. Extensive experiments have been carried on with the object of finding a suitable substitute, and some of the work done in France is covered in a recent article in *La Nature*.

Gold-platinum alloys, which have been available commercially for some years, contain about 12.5 per cent platinum. These alloys have the disadvantage of melting at 1200 deg. C., and softening at about 1500 deg. C., so that they cannot be subjected to great heat from the blowpipe without deforming. They resist acids very well and do not decrease appreciably in weight from one operation to another. They are generally used for work where a temperature of 1000 deg. C. is sufficient.

Gold-palladium alloys are capable of wider application and require less careful handling. They are widely employed in the U. S. A. by the names of "palan" and "rhotanium," usually in the form of crucibles, bowls, electrodes, etc. Their manufacture has now commenced in France. They can be heated without special precautions and resist the action of reagents better than platinum does. They contain at least 20 per cent of palladium and have the same color and appearance as platinum.

IN the article on the Campbell Transmission in our issue of March 13, the name of the manufacturer was inadvertently omitted. This transmission is the product of the Campbell Transmission Co., Buchanan, Mich.

The Lubrication of Motor Cars*

A Discussion of Methods Employed in the Lubrication of Steering Gears, Drag Links, Rear Axles, Springs, Spring Eyes and Road Wheels
—Oil and Grease Retaining Devices

By Capt. G. W. A. Brown

PART II

FIG. 21 illustrates the method of oiling the universal joints of a well-known car. To the author's mind, this seems more a method of disposing of the surplus oil from a badly packed gear-box shaft than a serious attempt to lubricate the joint pin. In any case, additional measures for lubricating the universal joint would appear to be necessary.

Live Axle—The strictures which have been made on the antiquated methods at present in use for lubricating gear-boxes apply equally, in the author's opinion, to back axles, and, in the same way, the author is of the opinion that the ideal way of lubricating this important part of a car is that illustrated in Fig. 22. In this system a plunger pump, driven by a cam on the differential casing, supplies oil, as can be seen, to all the revolving surfaces, including the bevel wheels at their point of meshing. It will be noticed that the driving shafts are tapered; this of course is essential from a stress point of view, but use is made of this taper to wind oil along it to the wheel bearings, whence it drips off and returns to the sump at the bottom of the axle casing.

In the "Fergus" car, the back axle (Fig. 23) is lubricated on the splash principle, i.e., the bevel wheel dips in oil contained in the casing, but there is no special provision for oiling the road wheel bearings, nor is there any method of maintaining the level of the oil with certainty, although a certain quantity of oil is constantly draining into the case via the spring housings and the torque tube.

Fig. 24 illustrates a trough system of lubrication similar to that already referred to for the gear-box.

III. Steering Gear: Drag Link Connections

As usually arranged, these connections are the most inadequately lubricated parts of the car. Whether knuckle joints or pin and fork joints are employed, the method of

treatment is the same, namely, to fit a grease cup on the joint and to surround the whole thing with a leather cover. The net result is that, after one drive on a wet day, if the trouble is taken to remove this leather covering, it will be found to be filled with water and mud. In any case, the author has noticed that there is a marked disinclination on the part of drivers of cars to fill grease cups, or even to turn them, the consequence of which is that rust soon sets in, accompanied by wear, and a serious accident may possibly occur.

In the "Fergus" car (Fig. 25), the lubrication of the steering gear has been carried out with the most commendable thoroughness. Here, it will be seen, provision is made for entirely filling the tubes with the lubricant, which finds its way into the ball and socket joints through suitable oil-ways, while the joint itself is rendered oil-tight by a metal cap held in contact by a spring.

A design of the author's, which also obviates the difficulties

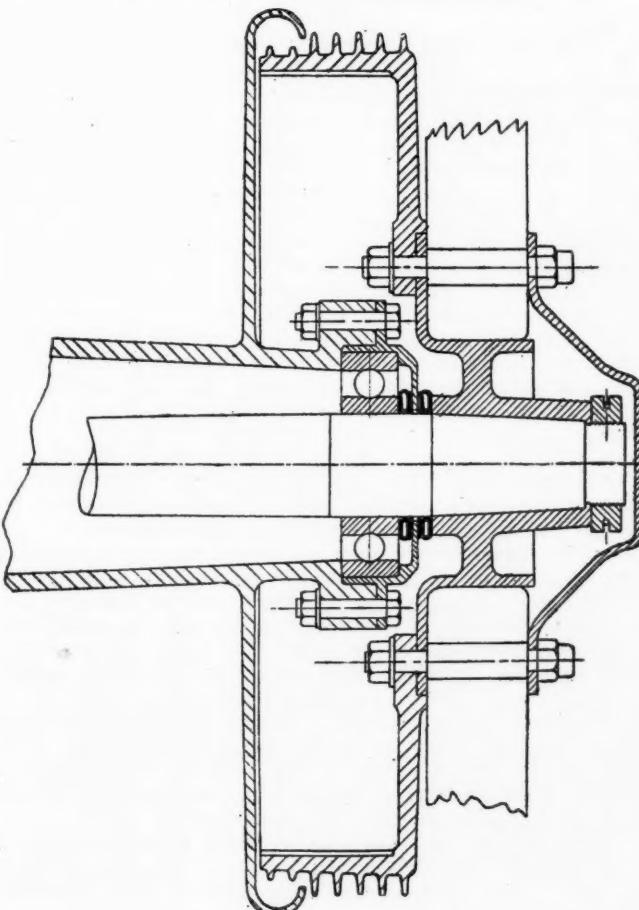


Fig. 22a—Outer end of oil-lubricated axle

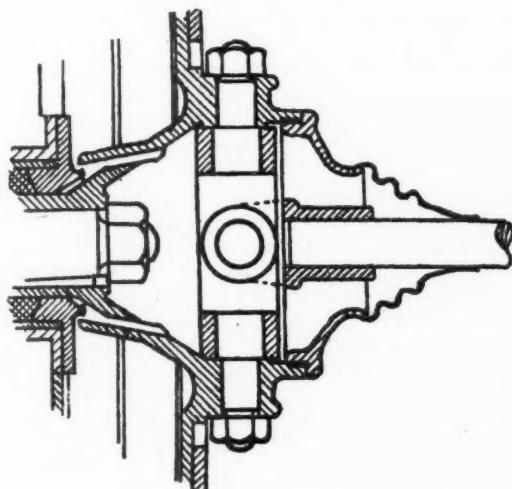


Fig. 21—Haphazard method of lubricating universal joint

*Paper presented to the Institution of Automobile Engineers, London.

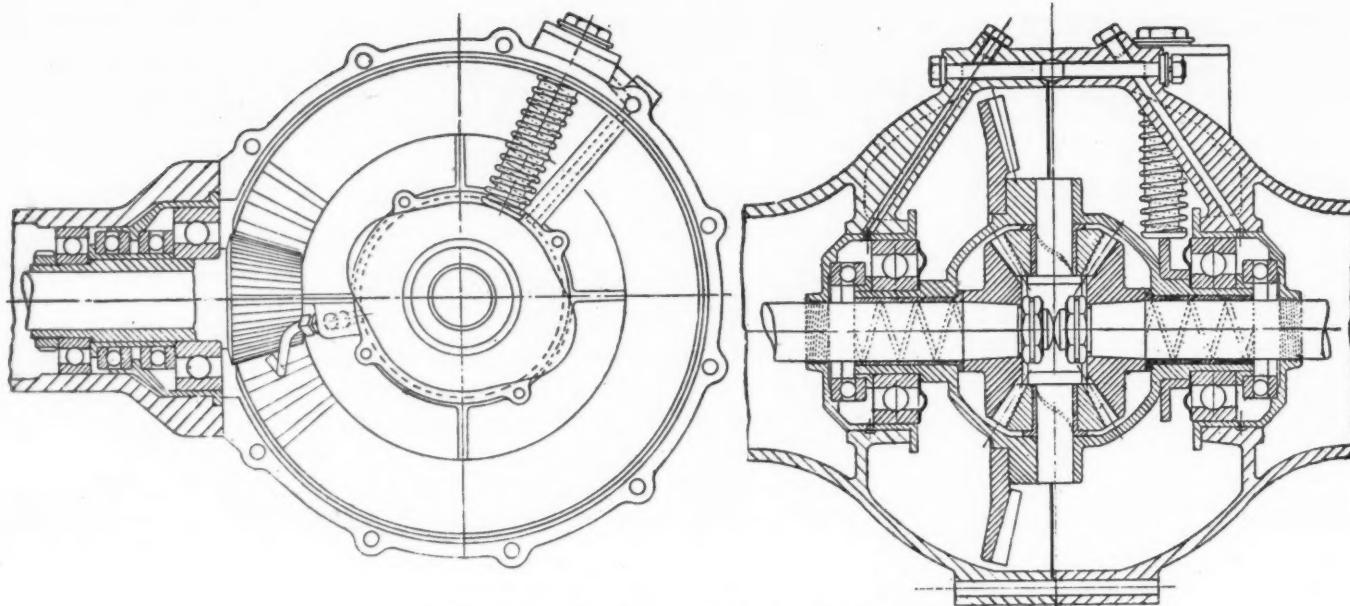


Fig. 22—Rear axle design with force feed lubrication

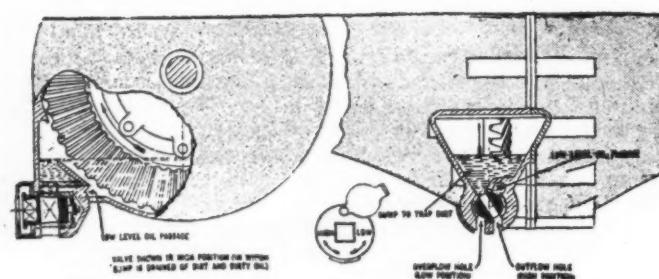


Fig. 23—Splash lubrication of Fergus rear axle

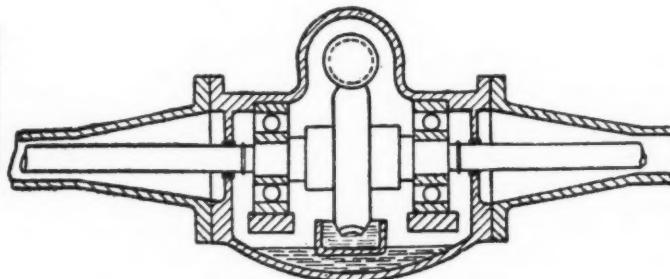


Fig. 24—Trough system of rear axle lubrication

already mentioned, and renders the lubrication of these important parts automatic, has met with a considerable measure of success. In this case the oil is retained in the ball and socket joint by the use of an oil-resisting fabric washer, which is so made that it is compressible to allow for angular changes in the relation to the ball and the rod.

It has also been suggested that the steering-box should be attached to, and be in communication with, the engine crank-case, whereby it would receive copious lubrication by splash. The author considers that there are more reasons against adopting this construction than there are in favor of it; with care the bearings and the worm gear can be efficiently lubricated by providing a removable plug of ample size so arranged that the casing can be well filled.

IV. Suspension

Various methods have been suggested for lubricating the leaves of the road springs. Normally, they come from the makers having had a mixture of graphite and oil put between the leaves before they are bolted up. This lubricant lasts them for a few hundred miles, when, if it is desired to renew it, it is necessary to jack the frame of the car up so as to take the load off the spring leaves, and, by means of a chisel or screwdriver, to pry the leaves apart and introduce fresh lubricant between them with the blade of a palette knife. It can be easily understood that, as this is a long and dirty operation, it is practically never done. One well-known maker, recognizing this to be the case, rusts the blades of his springs before he fits them to his vehicles, the assumption being that they will then give as easy suspension at the end of the car's life as they will at the beginning.

Other methods have also been proposed, namely, the fitting of perforated zinc or other non-ferrous metal strips between the leaves, the perforations being used to hold lubricant, while one concern supplies a graphite impregnated fabric for the same purpose.

The method recommended by the author (Fig. 26) is to

cover the whole of the spring with a stocking made of grease-proof fabric, and to attach this, in the case of a cantilever spring, to an oil-tight casing placed round the trunnion of the spring, and, at the forward end, to an oil-tight casing which carries the shackle pin, roller, or whatever the method of attachment at that part may be.

The casings are then filled with oil, and can be left, with the certainty that no further trouble will be experienced from the springs until the oil has been used up—a matter of 10,000 miles or more.

A rather crude method of enclosing the springs is reproduced in Fig. 27 from an illustration in *The Automobile Engineer* of July, 1918.

For cheaper constructions, we have the half-elliptic leaf springs bolted direct to the frame and the axle as in the "Stellite," "N. E. G." "Humberette," and several other pre-war cars of the cheaper class, while in America a variety of springs have been made and tested with the ends so designed that all the flexion is taken by the spring, thereby dispensing with the shackles themselves and the consequent number of joints. A few examples are illustrated by Fig. 28.

In the author's opinion, this is far too important a point for reliance to be placed on the occasional turn of a grease cup, for, on examining one or two well-known makes, it will be found that the load on these pins reaches somewhere between 250 and 500 lb. per sq. in., and, in nine cases out of ten, the grease hole and groove are situated on the loaded side of the bearing!

Oil-less Bearings—It would be improper to leave this subject without some description of a type of bearing which does not require lubrication as it is understood in the ordinary sense. The author refers to those bearings which are generically called "oil-less bearings." They are of several kinds, the most usual being a bronze shell in which a spiral groove has been cut, subsequently to be filled with graphite under pressure, illustrated in Fig. 29.

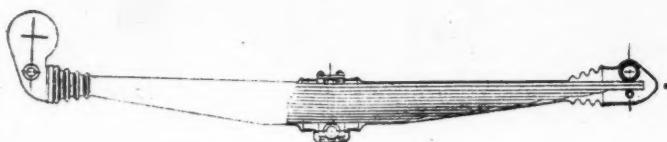


Fig. 26—Grease casing for body spring

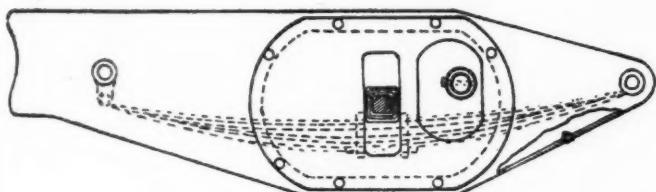


Fig. 27—Crude suggestion for spring enclosure

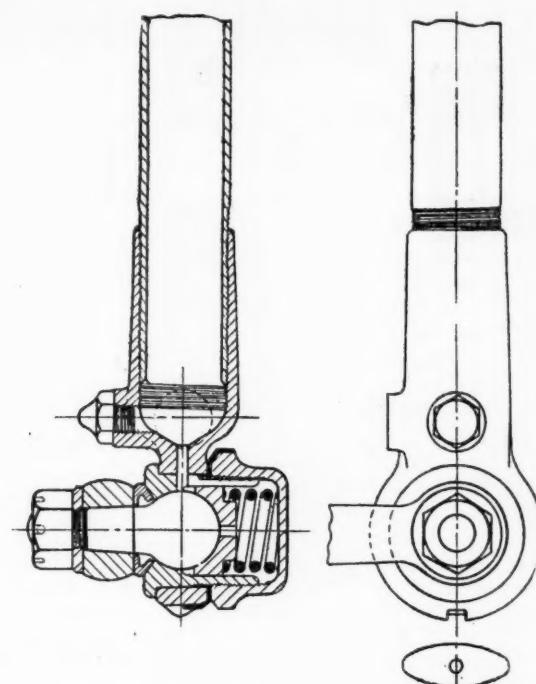


Fig. 25—Drag link connector lubrication

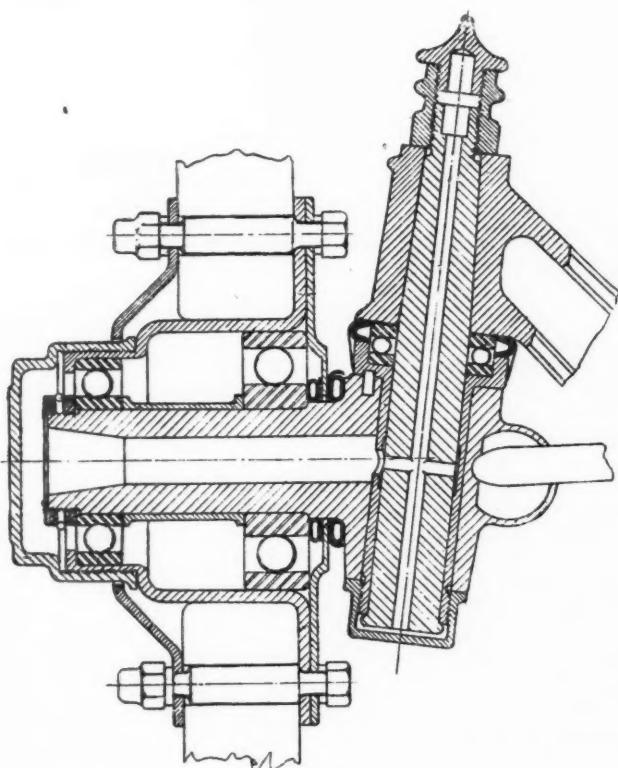


Fig. 30—Steering pivot and front wheel lubrication

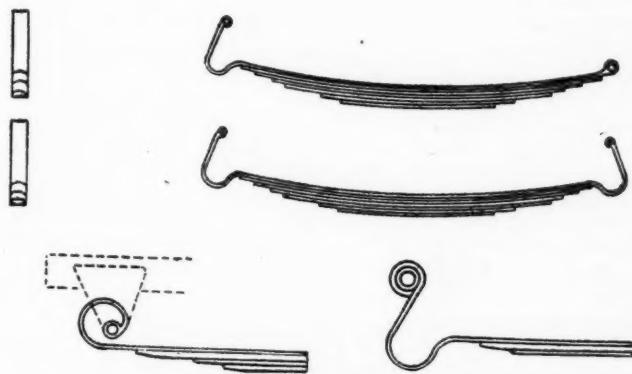
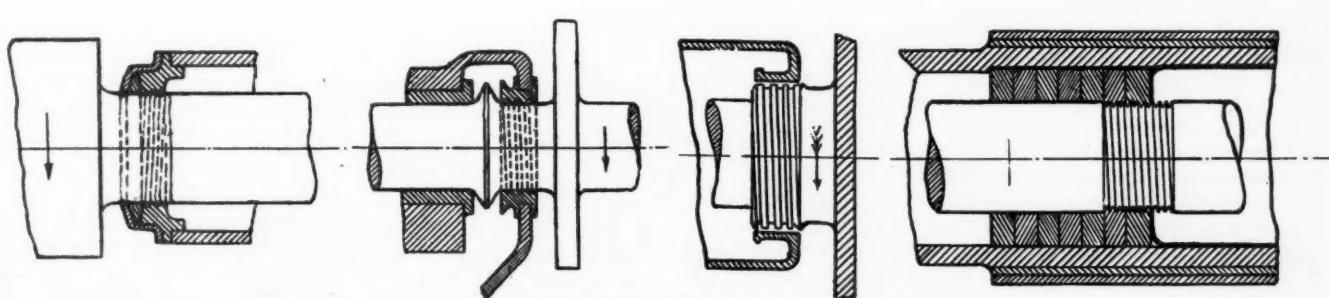


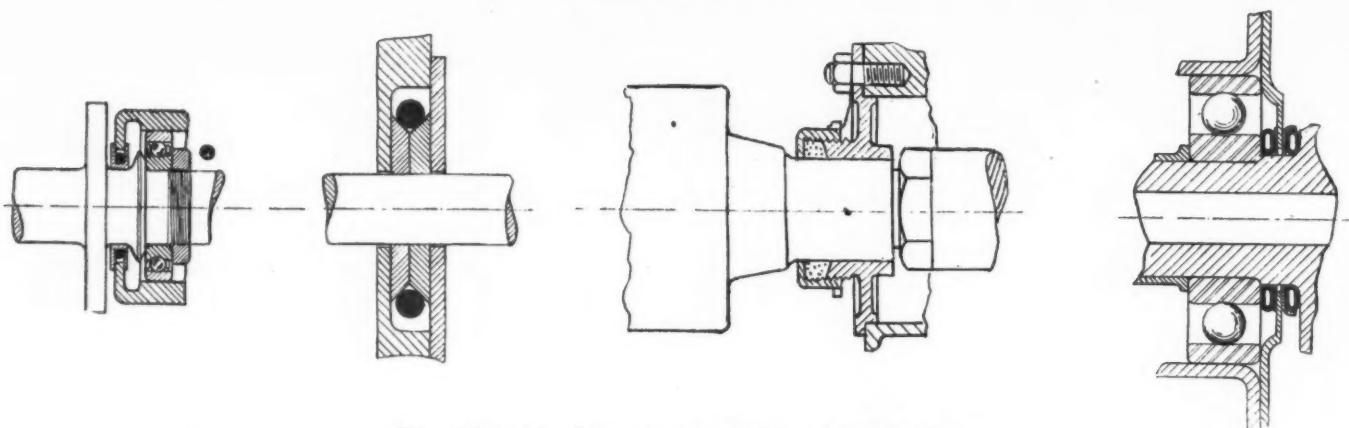
Fig. 28—Types of chassis springs with rigid connections



Fig. 29—Oil-less bushing



Figs. 31 to 34—Oil retaining devices



Figs. 35 to 38—Other forms of oil retaining devices

The author recently had an opportunity of investigating a very ingenious example of this type of bearing which is fitted to the "Marmon" car. The essential feature of this bearing is the provision of an inner and outer steel shell, between which is a lining of wire woven asbestos fabric which has been impregnated with graphite. The inner member of this bearing is dowelled to prevent it turning upon the pin or shaft, while the outer casing is forced into the boss of the bracket or lever. These bearings are used throughout the "Marmon" car for such parts as the spring shackles, brake levers, pedals, and the like.

V. Road Wheel Bearings

The well-known method of filling the hub with grease by fully loading the hub cap and then screwing it home, and so forcing grease into the bearing is open to improvement, as by this means only a small proportion of the grease is ever used. Fig. 30 shows a method favored by the author applied to the front hubs, from which it will be seen that one filling of oil will serve to lubricate the swivel pin and the hub bearings. Similar provision is also made on the "Fergus" and "Marmon" cars; one charge should last for a considerable period if proper measures are taken to prevent leakages. The same remarks apply to the bearings of the rear hubs, except that it is possible to lubricate these from the live axle supply, one method already having been mentioned.

VI. The Necessity for Efficient Retaining Devices

We cannot discuss methods of lubrication without devoting some time to the importance of suitably retaining the oil, and at the same time excluding the dust and water, which in many cases have largely contributed to the rapid destruction of ball and roller bearings. In almost any repair shop are to be seen numbers of racers worn and corroded beyond hope.

The best retainer in places to which water cannot have access and which are above the level of a body of lubricant, such as the ends of the crankshaft, the cam-shaft, or the gear-box main shaft, is undoubtedly the screw-thread, but the form of this is a matter which is open to discussion. Types now in use are shown by Figs. 31 and 34, and they all seem to be equally effective; the spiral groove cut in the stationary member works quite as well as the revolving screw on the shaft.

This is an important point, as it often happens that the revolving shaft or wheel-boss is so highly stressed that the addition of a screw-retaining thread could not be incorporated without seriously weakening the part; or, if the part itself is not threaded, dispensing with the necessary loose threaded collar, which could be fitted if room permitted.

Fig. 34 is a type of retainer used on the "Marmon" car for the back axle, and is interesting inasmuch as the screw is an ordinary Whitworth thread with a more rounded top, and is distinct from other types in that it revolves in the felt washers without clearance.

The scope of these types of retainer is, however, limited. They cannot be applied to the hubs of road wheels, for instance, because of—

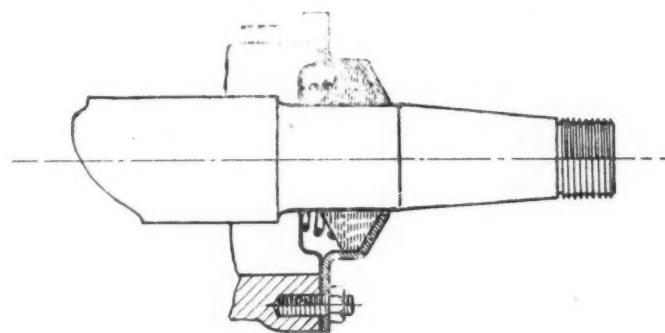


Fig. 39—Fergus gland packing

- (1) Risk of water entering when the car is reversed or being washed;
- (2) Admission of moist air when the car is laid up;
- (3) Liability of leakage when the wheels are stationary and the hubs filled with a thin lubricant.

The hubs of the front wheels particularly are in so exposed a position that in dirty weather the steering heads are literally covered with water and mud, while, when washing the car, the centre of the hub receives copious supplies of water under pressure from the hose.

For these two reasons alone, therefore, the very best provision for retaining the lubricant is a necessity.

In the back hub it is equally important, as, although usually protected by the brake drum and cover, the lubricant must not be allowed to leak on to the brake mechanism.

Various devices are illustrated in Figs. 35-37, while Fig. 38 shows a new form favored by the author, which is of simple construction and easy to renew, and which will be capable of serving its proper purpose.

The type shown by Fig. 37, which is really a gland packing capable of adjustment from time to time, is not ideal, as, when tight enough to exclude oil, the friction on the shaft is of no small moment, while the chance of its being properly attended to is somewhat remote, as, in the author's opinion, it may be in such an inaccessible position that it is very seldom noticed, and is in any case a too frequent and complicated operation for most owner-drivers to undertake.

A much better method is employed on the Fergus car, and is illustrated by Fig. 39. This type provides for the wear of the packing ring, and does not grip the shaft too tightly; it has already been employed for the packing of oil and water pump glands on aero engines and is found to be thoroughly effective.

ALLOYS of iron with certain of the rarer metals are used to a great and increasing extent as a means of introducing these metals into steel, with a view either to removing oxygen from molten steel and securing sound castings or to securing special mechanical or other physical qualities in the steel. The manufacture of ferro-alloys is one of the principal electric furnace industries.

F-5-L Navy Flying Boat

Details of the Engine Mountings and Fuel and Oil Tanks—The Gasoline Supply System

Part III

By S. T. Williams
Assistant Chief Engineer, Naval Aircraft Factory, Philadelphia

SUMMARIZING the entire F-5-L flying boat, it was defined as a twin-motored tractor biplane, the engine being mounted at each side of the boat hull; the hull carrying the gasoline supply, crew and part of the ordnance. It was stated to have a wing span of 104 ft., a chord of 8 ft. and a boat hull 50 ft. long, the total flying weight being about 7 tons.

Two Liberty engines comprise the power plant. These engines are identical with the engines used by the army, with the exception of the pistons. The pistons are given more clearance, so that the compression pressure is reduced. The result is a slight reduction in maximum horsepower but greater engine life. This is advantageous because in seaplane service long patrols place a premium on dependability; and a seaplane does not habitually frequent high altitudes or require the maximum available horsepower.

In the main, the engine mounting differs only slightly from the mounting of the Liberty engines in the Curtiss H-12 and H-16 seaplanes. Horizontal laminated engine bearers are carried on wooden V-struts over each main wing hinge fitting, and are attached to the upper panel by tubular A-struts.

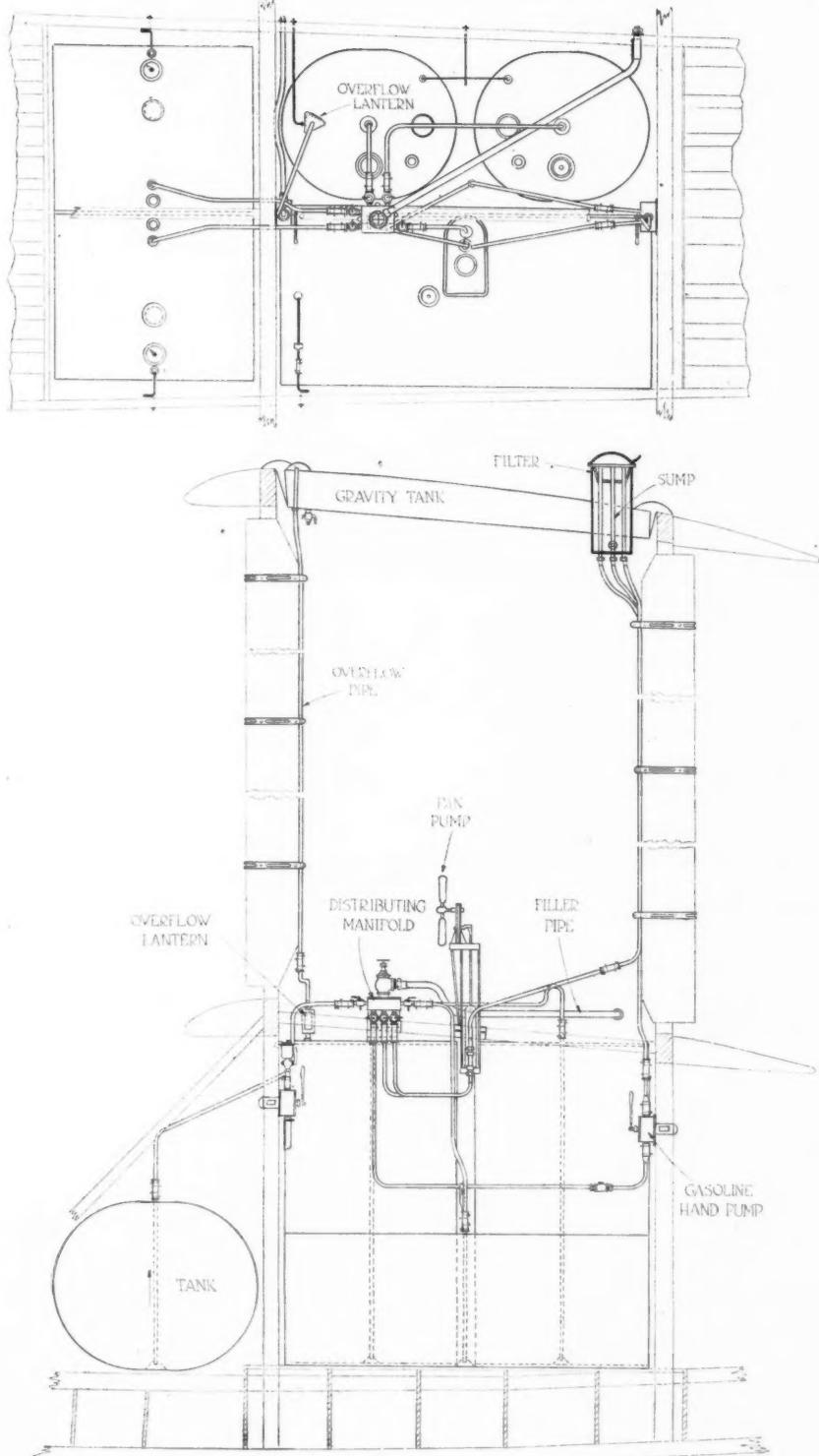
The radiator is carried on a bracket at the front, and the oil supply in streamlined tanks at each side of the bearers. However, in details, the F-5-L mounting is simplified, and made a better production proposition.

The first step was the elimination of drop forgings. Strap fittings built up and brazed together are used for attachment of bearers to V-braces, and the upper attachment of the A-brace to the engine section is also a strap fitting. This attachment is strong and simple. The ends of the tube are first fitted with a tubular sleeve, and then formed to a U-section.

In addition to the simplicity of construction, this end is extremely rigid. The A-braces are attached to the beam fitting through a universal joint bearing plate. This is also a built-up fitting.

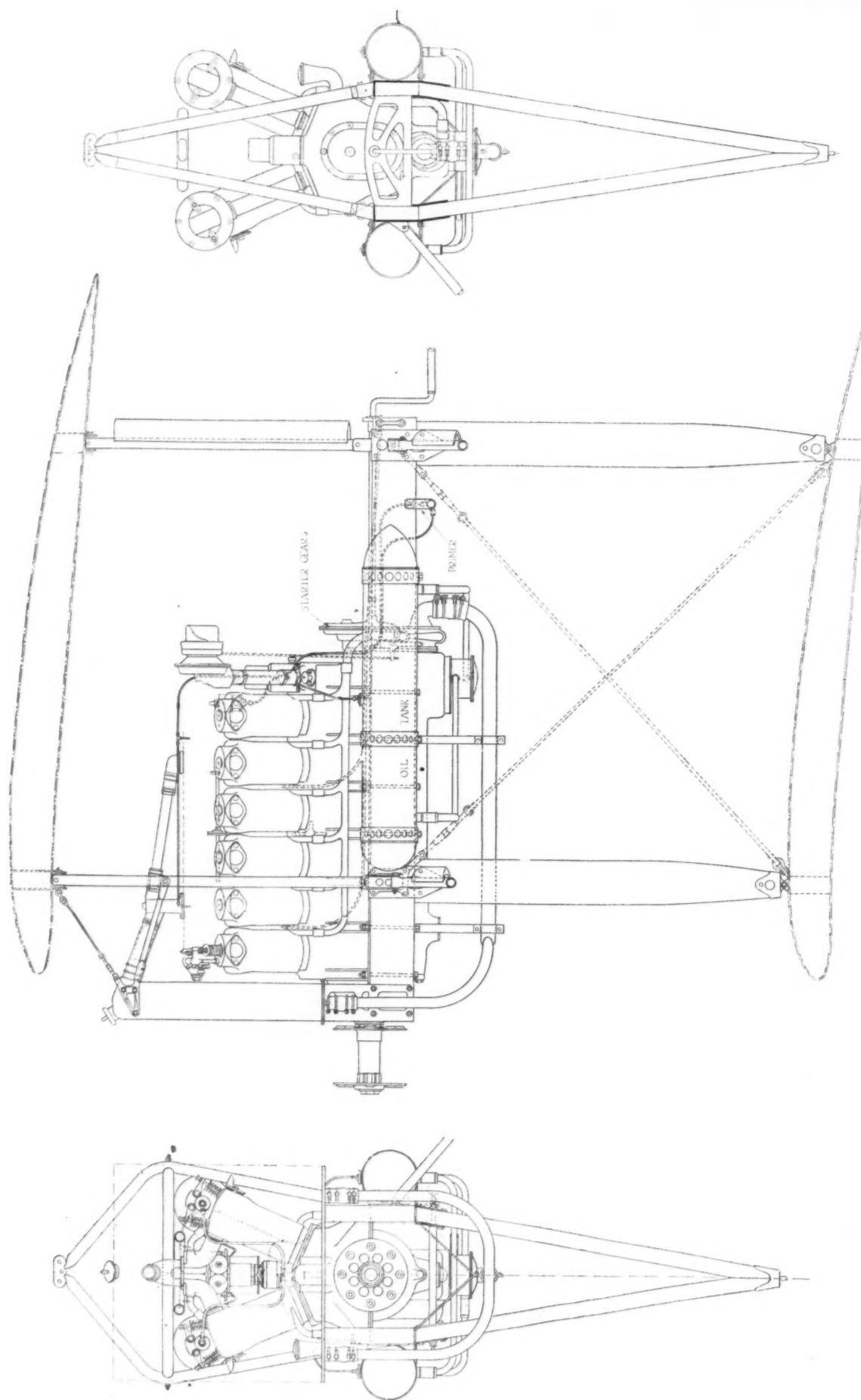
The forward A-brace is bowed to clear the engine cylinders, and the halves are tied together by a cross tube and through bolt. This brace must be removed before the engine can be taken from the plane, and the removable cross tube and through bolt permit this to be done.

Differing from previous construction, the engine bearers are carried forward so that a straight radiator bracket may be used. Previously, the bearers were cut off by the

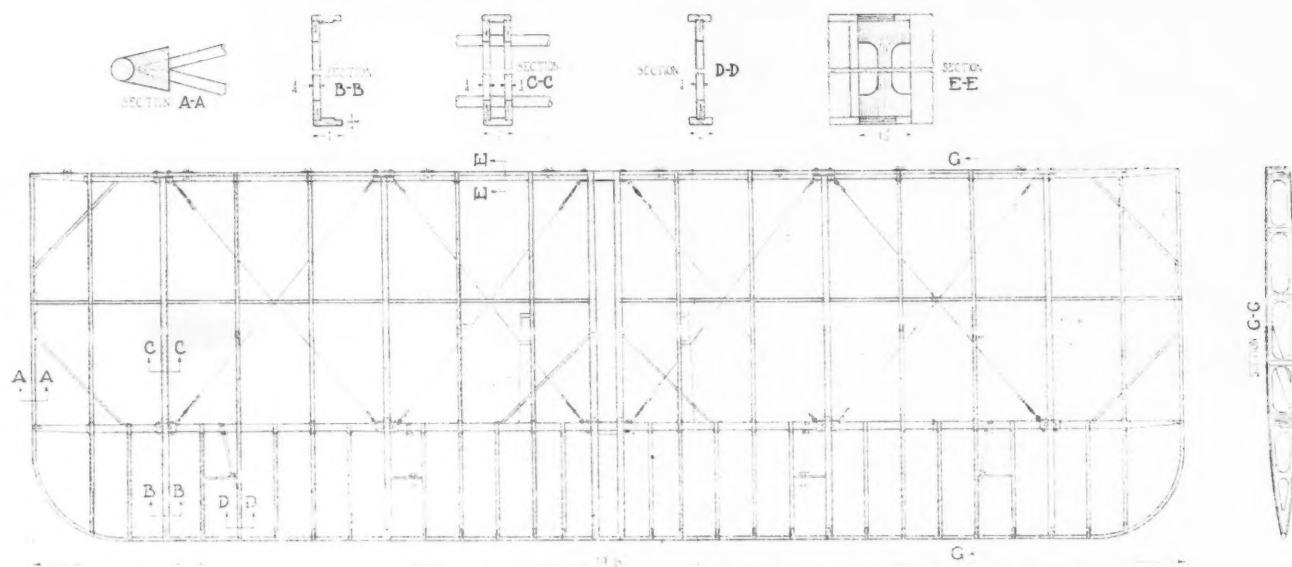


Plan and elevation scale drawings showing the location and method of installation of the fuel tanks in the F-5-L Navy flying boat

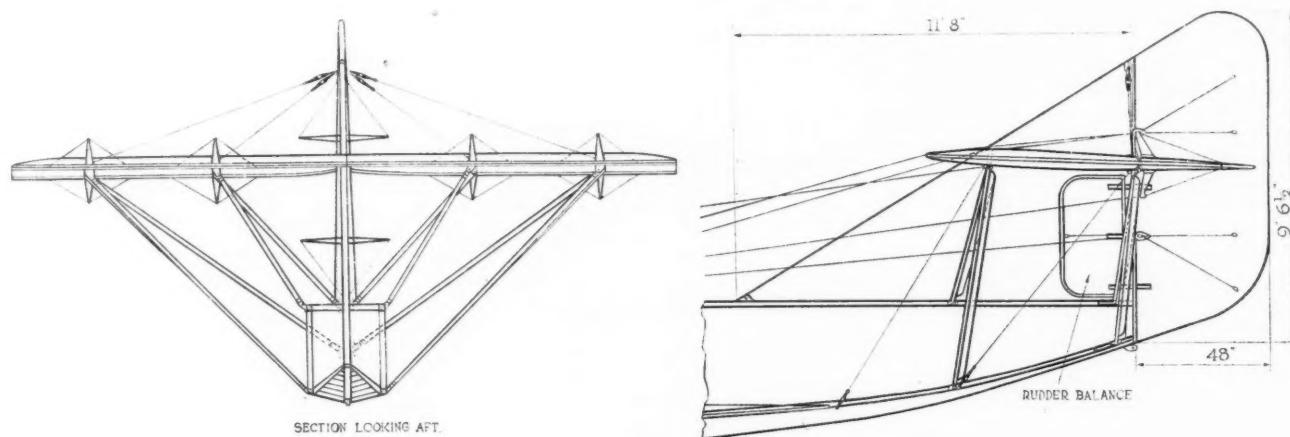
Scale Drawings of Liberty Engine Mounting in Navy F-5-L Flying Boat



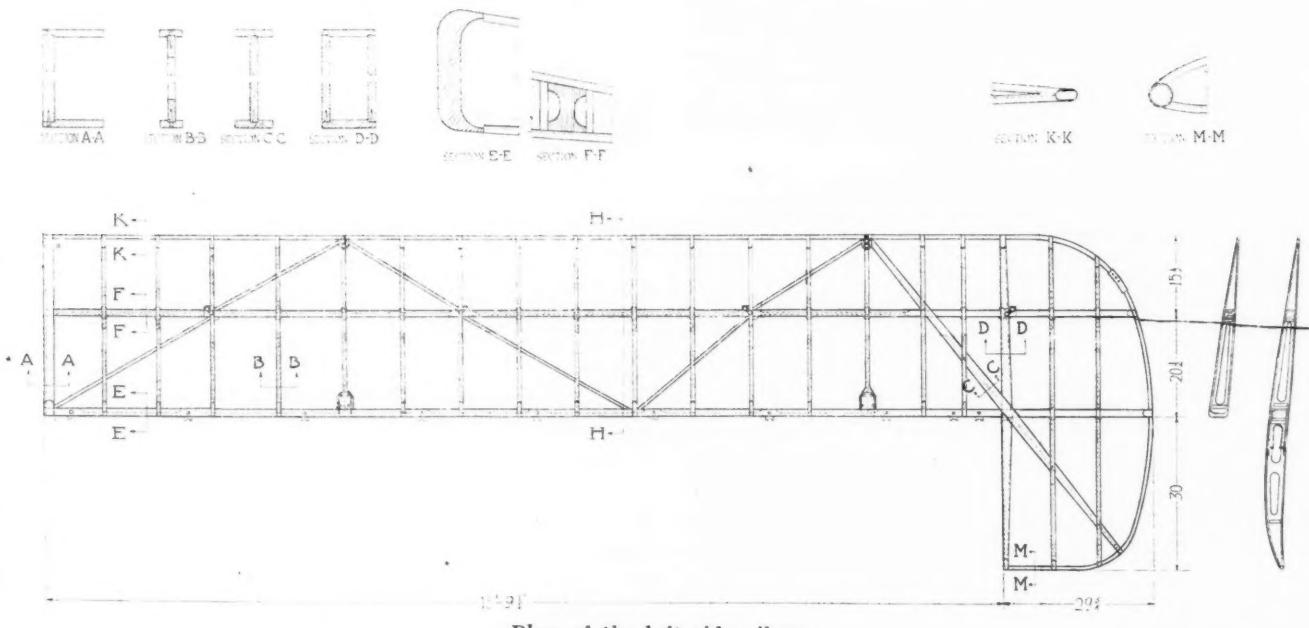
Panel and Control Details of F-5-L Flying Boat



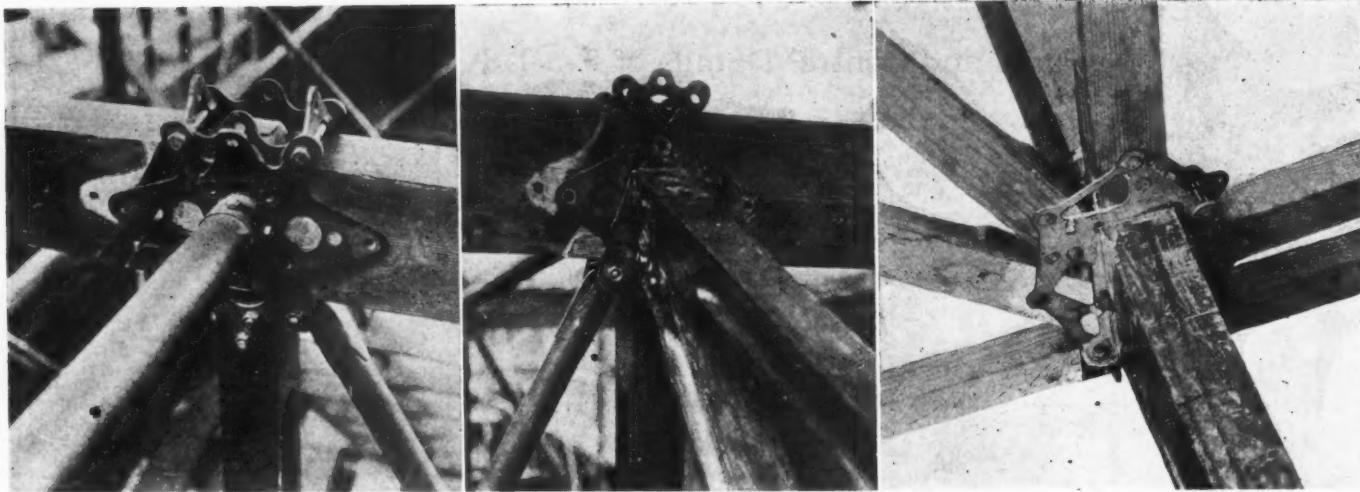
Details of the horizontal stabilizer



Dimensions and arrangement of the rudder and elevating gear



Plan of the left side aileron



EXAMPLES OF STANDARDIZED FITTINGS USED ON THE F-5-L NAVY FLYING BOAT

Front side of side wall beam center fitting

Center side wall beam support and fitting

Center side wall beam fitting, rear side

front engine flange and arched brackets used. However, the straight bracket is simpler to construct, and is possible on Liberty installations.

In an installation of this nature, it is, of course, impossible to start the engines by hand cranking on the propeller. For this reason a rear hand starter, comprising a reduction gear and clutch engaging the crankshaft, is used. One man can readily turn the engine over, though two are generally used.

As stated, the oil tanks are streamlined, cylindrical, and mounted at each side of the engine bearers. The total capacity per engine is 17 gal., and the two tanks are connected by a manifold, the division simply being constructional.

In later planes the side oil tanks are being superseded by one streamlined tank mounted between the engine bearers and behind the engines. This serves to clean the installation up to a marked extent.

A long-distance thermometer bulb is installed in the oil return line, and the gage is mounted in the mechanics' compartment by the tanks.

The oil pressure gage is installed on the pilots' instrument board. A water thermometer gage likewise is in the mechanics' cockpit. This location of the thermometers is because engine temperatures are of enough importance to demand quite frequent attention.

The gasoline supply is carried in five tanks placed amidships in the hull. There are two large cylindrical vertical tanks, one fore and aft horizontal tank, and two transverse horizontal tanks. The latter two were originally consolidated, but the single tank could not be removed without taking the plane to pieces. All have a total capacity of approximately 498 gal.

As these tanks are below carburetor level, a header or gravity tank is necessary. This is located in the upper wing, between the two engines, and carries about 20 gal.

The gasoline is pumped from the hull by a double-barreled windmill pump, and forced into the gravity tank sump. From this sump leads are taken to the two engines, and the surplus over this amount flows through small holes in the sump sides into the gravity tank.

Construction of Gravity Sump Noteworthy

When the gravity tank becomes full, an overflow pipe carries the excess back through a sight box into one of the tanks. And this overflow serves to show the mechanic that gasoline is being pumped and that the gravity tank is full.

The construction of the gravity sump is noteworthy. It will be noted that the base of the sump is somewhat below the bottom of the tank, and that the two are only connected through small holes at the sump sides. Hence if the gravity tank be shot away, the supply of gasoline pumped may be shut down to the amount used, with the base of the sump alone serving as a header tank.

A semi-rotary hand pump is used to fill the gravity tank when the windmill pumps are inoperative. This pump is an English design, and a similar pump is also used for bilge water.

The leads from all the supply tanks are consolidated into one manifold, and by regulating the valves gasoline may be pumped from any tank into the gravity tank. However, it all returns into the starboard forward vertical tank, and in flight gasoline is pumped alternately from this tank and each of the other tanks in rotation. It is necessary to pump from the tanks in rotation in order to trim ship and a separate manifold would be necessary to return the overflow gasoline to any tank.

Manifold Incorporates Filler Valve

It is to be noted that the manifold incorporates a filler valve piped to a union at the hull sides. This serves for the attachment of a pipe line from a supply boat or tank that the seaplane tanks may be filled by gasoline under pressure. Though this method of filling is not much used it is stated all the tanks may be filled thus in a few minutes whereas the funnel and measure method takes from a half to one hour.

There are few other points of interest in the gasoline system, standard sumps being used to prevent water and dirt from reaching the engine and dial gages being used on the tanks to show the gasoline supply at hand. Throughout the system all pipe line connections are through olive joints, and the features here are ease of connection, flexibility, and the fact that full flow of gasoline is permitted. As an aid to starting, a small hand primer permits raw gasoline to be pumped into the intake manifold.

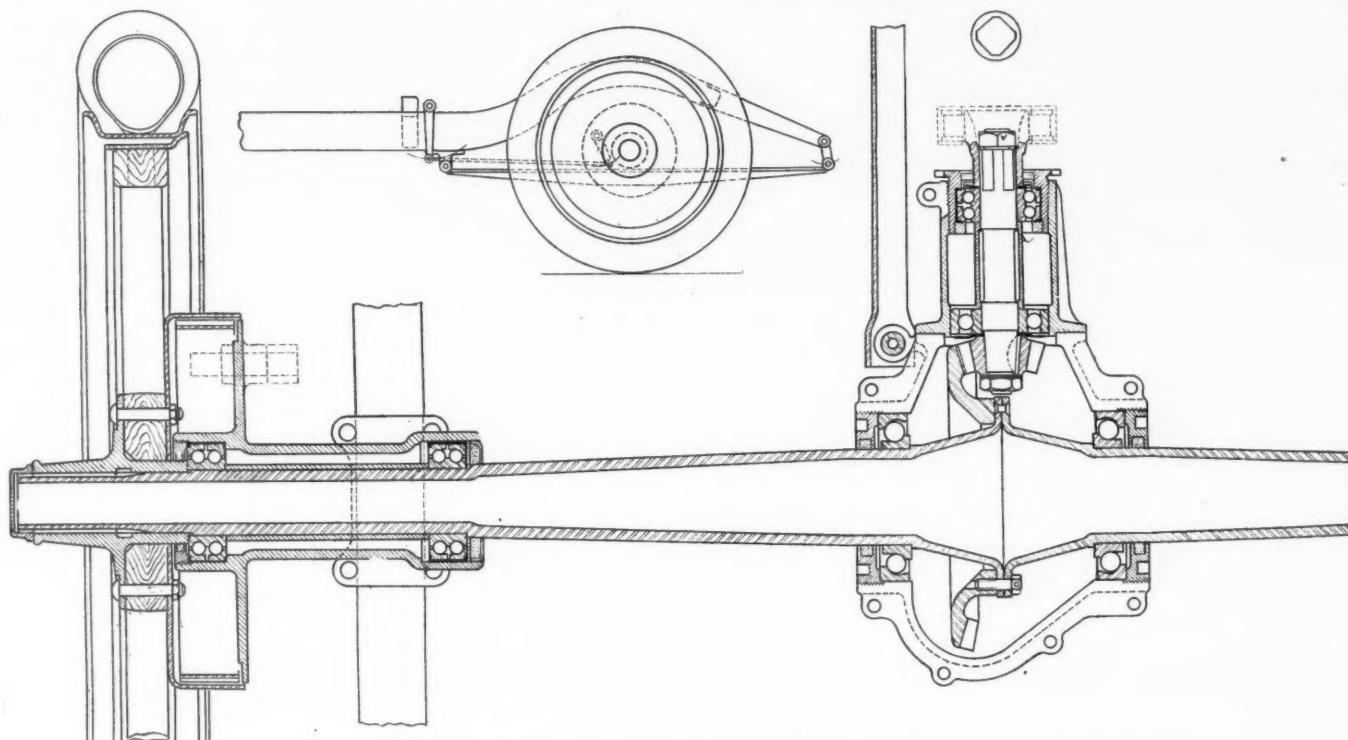
(To be continued)

Advocates Adoption of Metric System of Weights

THE adoption of the metric system of weights and measures is advocated by Harry Alcock in the *Bulletin* of the Federation of British Industries. He suggests that the Government should encourage the more widespread use of the international metric system both in the United Kingdom and in the British Empire generally by officially recommending all British manufacturers hereafter engaging in new industries, or introducing new standards into existing industries, to base their operations on the metric system on the distinct understanding that the Government will adopt that system as the sole legal system of weights and measures five years hence, or upon such later date as Parliament may then decide. He also suggests that the requirements of all Government departments should be specified in terms of the metric system wherever possible, and recommends other public and semi-public buyers to follow their lead in the national interest.

Kline Undivided Driving Axle

Is Built Without a Differential and Has Hollow Driving Shafts Which Also Serve as Carrying Members, Giving a Low Unsprung Weight



Section through Kline's solid driving axle

A RATHER interesting design of driving axle has been patented by Harmon J. Kline of Detroit, Mich. A sectional view of this axle is shown in the accompanying illustration. Mr. Kline's object in designing this axle was to produce a design that is relatively light in weight, inexpensive in construction and durable.

It has been proved in automobile racing that it is not necessary to employ a differential gear on a high speed car; under certain conditions of operation the differential is a positive detriment, as when one of the driving wheels stands on slippery ground, when it is impossible to obtain the necessary traction. The braking also becomes defective as the result of the differential action.

A tubular construction was adopted for the axle shaft in order to obtain an axle of maximum strength for a given weight. The great section modulus of the axle will enable it to easily withstand the strain due to the slight slippage of the wheels while turning corners.

The advantages of the low, unsprung weight are well known. A car having this feature will be easier riding, and will be less hard on the tires. Of course, the effect on the tires will be more or less neutralized by the increased wear due to slippage in turning corners.

An axle of this type would be most suitable for a speed car intended mainly for touring. Its low cost of construction would be a factor in its favor.

Steam Tractors in Germany

THE use of steam tractors and tractor wagons for the transport of heavy loads which came into favor in Germany during the war, owing to the shortage of motor trucks and fuel, has proved so satisfactory even in the most congested districts of Berlin that it is expected that that mode of transport will be used to an increasing extent after the war where rapidity of transport is not of great importance. Some re-

laxation of transport regulations, to which such tractor-trains are subject, will, of course, be necessary, owing to their weight exceeding 9 tons. A law and a decree exist according to which it is necessary for users of heavy road vehicles to obtain the permission of the authorities responsible for the maintenance of roads before such vehicles can be allowed to ply. It is suggested that the speed of steam tractors should be limited to 6 km. per hour, thus getting over the objections of the road authorities, who fear further increased maintenance expenses. The strengths of certain bridges would also have to be increased to bear the extra loads involved, and smoke and soot would have to be eliminated as far as possible. Coke has been used successfully for this type of tractor in Berlin.

Duration of Gas Explosion

C. A. NORMAN, in a paper read at the recent annual C. meeting of the American Society of Mechanical Engineers held in New York, in support of his opinion that combustion is not complete before expansion begins, said: "Clerk concludes from his experiments on an engine running at only 160 r.p.m. that some combustion is proceeding after the whole normal expansion stroke and whole intervening compression stroke. All experiments with closed vessels show gas explosions to take certainly not less than one-fortieth of a second, and this with only rich mixtures. With normal mixtures it takes a much longer time than that to reach the maximum pressure. Turbulence accelerates combustion very much. Yet such direct experiments seem to show that with normal mixtures even a turbulent combustion would take quite one-fortieth of a second. That, however, is exactly the time occupied by the whole expansion stroke of an engine running at 1200 r.p.m. We have, then, absolutely no reason to assume that the combustion is complete before the expansion begins."

AUTOMOTIVE INDUSTRIES

& AUTOMOBILE

PUBLISHED WEEKLY
Copyright 1919 by the Class Journal Co.

Vol. XL

Thursday, April 3, 1919

No. 14

THE CLASS JOURNAL COMPANY

Horace M. Swetland, President

W. I. Ralph, Vice-President

E. M. Corey, Treasurer

A. B. Swetland, General Manager

U. P. C. Building, 239 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL

David Beecroft, Directing Editor
P. M. Heldt
DETROIT OFFICE
J. Edward Schipper

Sydney Oxberry

WASHINGTON OFFICE

Allen Sinsheimer

BRANCH OFFICES

Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
Detroit—95 Fort Street, West, Phone Main 1351
Cleveland—Guardian Bldg., Phone Main 1142
Philadelphia—Widener Bldg., Phone Walnut 601

Cable Address—Autoland, New York
Long Distance Telephone—8760 Bryant, New York

SUBSCRIPTION RATES

United States and Mexico	One Year, \$3.00
Canada	One Year, 5.00
Foreign Countries	One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

HORSELESS AGE SUBSCRIBERS

Subscriptions for the Horseless Age transferred to the subscription list of AUTOMOTIVE INDUSTRIES in the merging of the two publications will be completed in full by the weekly issues of AUTOMOTIVE INDUSTRIES to the dates of expiration shown on the records of the Horseless Age Co.

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Industrial Training

A LITTLE over a year ago, when it was attempted to supply the Army's needs in carpenters, plumbers, electricians, machinists, etc., from the young men in the draft, it was found that the number of mechanics available was not half enough, and to make up for the deficiency the plan of giving instruction in the handicrafts at the different colleges and universities of the country was conceived and put into effect. The schedule called for the training of 90,000 men, each of whom was to be given two months' schooling. It is obvious that in this limited time it was impossible to impart to the soldier-students a variegated training, so it was decided to teach each set of men a certain well-defined subject, but to make them as nearly as possible perfect in that branch.

The experience with the young men in the draft discloses a defect in our educational system. We see to it that every child gets a common school education, and up to the age of 14 the educational needs

of all are provided for. Then follows that important period in life from 14 to 18 years, when the boy is usually allowed to do as he pleases. Instead of looking ahead and endeavoring to get a sound training in some good vocation, he will select the job that pays the best or that seems to require the least exertion. Employers also often take a narrow view of the situation, endeavoring to obtain the most work out of the boys without giving them a chance to qualify themselves for something better in years to come.

In Continental Europe industrial training schools have been a regularly established institution for a great many years. All young men engaged in learning trades are required to attend industrial evening schools in which such subjects as geometry, mechanical drawing, commercial arithmetic, etc., are taught. England last year introduced a similar system and the United States is now the only great industrial power in which the training of young men in secondary industrial schools is practically unknown.

We have been trying, by the extreme division of labor, to minimize the need for skilled men and have achieved really remarkable results in this way, but in the case of an emergency like the late war the country would be in a much more secure position if it possessed a greater number of well-trained mechanics. Would it not add greatly to our national assets if, instead of allowing our boys beyond the grammar school age to while away their spare hours in idleness, we compelled them to attend classes in which are taught the practical subjects listed above?

Dual Rotation Engines

MOST prime movers comprise one major stationary and one major movable part, and the output of power per unit of weight or bulk depends greatly upon the speed of the moving part. What really counts is the speed of one part relative to the other, but as long as the one part is stationary this is the same as the absolute speed of the other part. Assuming the speed of the moving part to be limited by conditions of strength of materials, it follows that if both parts could move, in opposite directions, the power obtainable from an engine of given dimensions could be greatly increased.

This principle was first applied to electric automobile motors. The armature speed of an ordinary automobile motor is limited by the fact that a single step gear reduction to the rear wheels is usually desired, besides which the wear and tear at very high speeds is excessive. By mounting the field frame so it can rotate, the relative speed of armature and field poles—and hence the output—can be doubled without increasing the strain on the parts and without introducing difficulties in gear reduction. The armature is geared to one road wheel and the field to the other, and the incidental advantage is gained that no differential is required.

The same principle may be (and has been) applied to internal combustion engines. Indeed, after Sequin in France and Farwell in this country had developed the rotary cylinder engine it was a foregone conclu-

sion that before long some one would build an engine in which both the cylinders and the crankshaft rotated. Textbooks on aircraft engines mention a Burlat engine which is of this type, but little has been heard of this engine's practical performance. It is evidently a long step from the mere conception of the idea to its practical embodiment in successful form. But the war has also seen this idea carried to fruition, for during the latter stages of the struggle the Germans put into service a single seater with a Siemens & Halske dual rotation engine which for a 240-hp. engine has the remarkably low weight of 1.78 lb. per horsepower, besides which the fuel consumption is said to be little if any more than that of stationary cylinder aircraft engines.

In connection with the early dual rotation engines, it was planned to use double propellers, say a right-handed traction propeller and a left-handed pusher propeller. This plan, of course, does not work out well in the case of single-seater scout machines, and the Siemens & Halske has only a single propeller, which is secured to the revolving cylinder structure. There is a gear connection between the cylinder structure and the crankshaft, comprising a set of three bevel gears, two of them coaxial, which are keyed to the crankcase hub and the crankshaft respectively, and the third on a stationary shaft or

stud, meshing with both of the others. The power of the rotating crankshaft is thus transmitted to the oppositely revolving crankcase through the bevel gearset.

It is quite possible that the successful application of the dual rotation principle will revive the vogue of the rotary aircraft engine. With this construction it is possible to use comparatively low absolute speeds, so that the centrifugal stresses and the gyroscopic effect of the engine on the plane can be kept down. In fact, the gyroscopic effect can be practically eliminated, owing to two sets of parts rotating in opposite directions. Owing to the high virtual speed, that is, the short period of time required to complete the cycle, the thermal efficiency is bettered. With all rotary engines the churning of air is a serious source of power loss and with low speed of rotation this will be lessened. Finally, low speed tends to increase propeller efficiency.

The chief objection to the rotary engine in aircraft work so far has been its uneconomical use of fuel. This probably was due to the peculiar cycle employed and can hardly have any direct connection with the rotary principle. Since air cooling permits of, and in fact compels, the use of higher cylinder temperatures, it should be possible to overcome this handicap.

Tractor Development Threatened by Legislation

DURING the early period of automobile development a great deal of restrictive legislation was passed which considerably hampered the popularization of the new means of locomotion. It now looks as though a similar flood of tractor legislation was about due. There will be this difference, however, that whereas automobile legislation sought to regulate the use of the machines, tractor legislation will be so drafted as to control their sale.

Committee to Pass on Makes

In Nebraska legislation is proposed whereby a committee to be appointed from the Faculty of Agriculture of the State University is to be given power to determine which tractors shall and which shall not be allowed to be sold in the State. This would be an entirely new departure in legislative interference in business. The farmer buys a lot of other machinery besides tractors, such as binders, threshers, hay loaders, etc., and, if our memory serves us, no legislation has ever been adopted to appoint committees to pass on the worth of different makes of these machines. All these different classes of farm machinery had to pass through a development stage, when they were far from perfect. This stage unfortunately cannot be eliminated by legislative action. As the saying goes, a child has to crawl before it can walk, and so with new types of farm machinery: The best possible use has to be made of them while they are being developed.

Probably the argument will be made that the farmer should be protected against unscrupulous

manufacturers who offer a product that is not up to the standard of the times and who do not stand behind it with adequate service facilities. The answer is that the best protection that can be given is that resulting from the system of selling through local agents. The farmer does not buy his tractor by mail from a catalogue house but from a nearby dealer, which latter often also sells automobiles and farm implements.

If a dealer in selecting his line picks a poor machine, or if he falls down on his repair service, the news will soon spread over the whole neighborhood and give him a serious set-back, if it does not ruin his business. Therefore, the dealer has very much at stake in making connections, and we believe the farmers' interests are safer in his hands than in the hands of a committee with no personal responsibility but with all the power of the State Government behind it.

To Compel Parts Service

Another thing which it is proposed to regulate by law is the maintenance of a parts supply in the state. While it is possible to compel manufacturers to maintain stocks of parts as long as they are selling tractors in the state, the chief difficulty in the past has been due to unsound manufacturing concerns going into bankruptcy and leaving customers with orphan machines on their hands. Now, it is quite conceivable that firms having the official sanction would fail in business, and the paternalism of the State would then prove of little avail to the farmer.

□ Latest News of the

10% Duty in France on European Cars and 45% on American

Congress of Automobile Manufacturers, Representing America, France, Belgium, England and Italy, Decides in Favor of Stiff Tariff—Attempt at Secrecy Badly Received

PARIS, March 10—A European import duty of 10 per cent against all European cars and a 45 per cent import duty in all European countries against American automobiles was the decision arrived at in the Congress of Automobile Manufacturers representing America, France, England, Italy and Belgium which met in Paris this week.

The Congress also voted that the Paris show would be held in the Grand Palais during the month of October, the London show in November, Brussels show in December, New York in January, and Chicago in February, as published in AUTOMOTIVE INDUSTRIES, March 27, page 721.

Before the war there existed a Union of Recognized Automobile Manufacturers' Associations. Germany and Austria were members of this Union. America was never invited to take any part in it. Its headquarters were in Paris, and the general secretary was Henri Cézanne, who is also secretary of the French Automobile Manufacturers' Association. It is impossible to hold a meeting of this Union without inviting Germany and Austria, and as there is no intention of entering into negotiations with these enemy countries, the union is being allowed to die a natural death.

45 Per Cent Duty on American Cars

On the other hand, it was necessary that there should be an exchange of views between the automobile manufacturers of Allied countries. The French manufacturers' association, therefore, invited delegates from England, Belgium, Italy and America to a meeting to be held in Paris. The American delegate was C. C. Hanch, representing the National Automobile Chamber of Commerce. It was this meeting which voted 45 per cent import duties throughout Europe against America, while retaining a 10 per

cent duty among European countries.

A well-organized attempt was made to prevent any of the decisions of this congress reaching the press. While the proceedings were in progress not an atom of news was allowed to leak out.

When the congress came to a close an official communication was made to the press, but this had obviously been written with a view to hide the truth. Gradually the news leaked out, and finally, 3 days after the closing of the Congress, a French journal, *L'Echo des Sports*, revealed the whole proceedings. This attempt to put a cloak of mystery around the meeting has been very badly received in France.

As the outcome of this meeting a permanent Bureau of Inter-allied Automobile Manufacturers has been created. The American representative on this Bureau is the National Automobile Chamber of Commerce; France is represented by the Chambre Syndicale des Constructeurs d'Automobiles; England, by the Society of Motor Manufacturers & Trades; Belgium, by the Chambre Syndicale de l'Automobile de Belgique, and Italy by the Union Italienne, of which Engineer Marchesi, of the Fiat Co., is president. It is to be noted that this is the first time the American Automobile industry has been officially recognized by European manufacturers.

Mr. Hanch, who attended the meeting on behalf of the National Automobile Chamber of Commerce, refused to make any statement regarding the proceedings. He said that he had been sent over as the official delegate of the Chamber, and while in Europe intended to visit the leading automobile factories of France, Italy and England.

L'Echo des Sports, an independent French paper, has protested in strong language against the decisions of the Congress. It maintains that

the importance of America as an automobile exporting nation is decreasing. In 1910, it declares, America exported 11 per cent of its automobile production; this dropped to 10 per cent in 1911, 8 per cent in 1912, 6 per cent in 1913, and 4 per cent for the first 6 months of 1914. All the European countries are automobile exporters. Thus, during the year 1913-1914 France exported 44 per cent of her automobile production, Italy 71 per cent, England 52 per cent, and Belgium 38 per cent. Protectionism, declares this paper, will ruin France.

France Favors 45 Per Cent Duty

PARIS, March 14—America has the reputation of being the home of yellow journalism, but the Hearst papers have been outmatched entirely by the Parisian journal *L'Echo des Sports*. When the Inter-allied Congress of Automobile Manufacturers was held in Paris last week all the business papers were annoyed at being unable to get anything more than a brief official summary of the proceedings. It was known that the question of import duties had been discussed, but no real information on this matter was issued.

Three days after the closing of the Congress *L'Echo des Sports* came out with what it claimed was a complete report of the proceedings. It maintained that the Congress had voted in favor of 10 per cent import duties in all European countries against European cars, and 45 per cent in the same countries against American cars. It now appears that this information was substantially correct, although no actual vote was taken.

The information was printed in such a way that it appeared to have been given out by C. C. Hanch, delegate of the N. A. C. C. now in France. Further, *L'Echo des Sports* hinted that it and Mr. Hanch were the only ones in possession of certain statistics regarding European and American exports. It also declared very proudly that on the day after the meeting Mr. Hanch sent a cable to Southerland E. Taylor, export manager of the Studebaker Corp., expressing his satisfaction at the vote taken by the Congress on this matter.

The facts are that there is no such person connected with the Studebaker Corp., that Mr. Hanch sent no telegram to the United States, and that he gave no information to any member of the press. All the information given by *L'Echo des Sports* with regard to Mr. Hanch originated in the fertile brain of the *Echo des Sports* reporter.

Automotive Industries

□

Ten French Firms in Union

No Competition in Models—Will Pool Purchases and Manufacture

PARIS, March 14—Ten French automobile manufacturers have formed a union to make their purchases in common, thus getting the advantage of lower rates; to standardize many parts of their cars, to avoid direct competition by the production of similar models, and to produce a joint cheap car. The ten firms involved are Delage, Darracq, Clement-Bayard, Unic, Aries, Charron Limited, Delahaye, Brasier, Chenard-Walcker and Lorraine-Dietrich.

While the war was in progress it was suggested that the French manufacturers should co-operate through their national association in order to avoid direct competition, and get the advantage of standardization of parts. After negotiations had been carried out, it was realized that the entire trade was too big for real co-operation. As a consequence, the initiative was taken by Louis Delage to get together a group of manufacturers who would reveal their plans to one another, and who would co-operate toward standardization and low cost of production. The ten firms forming this group are all, roughly, of the same financial and engineering importance. The biggest does not employ more than 6000 workers, and the smallest has a staff of 2000. They do not all aim at producing the same type of car; indeed, one of the objects of the union is to prevent this, but they all do good engineering work.

One of the first results of this union is that no firm will build more than two models, and, as far as possible, each one will endeavor to avoid coming into direct competition with the type of car built by another member of the union. In order to make this possible, the members agree to put their plans before the union, and in case of dispute to submit to arbitration. An engineer who was formerly with Delahaye has been appointed general engineer for the union, and will work on questions of standardization and records for all ten firms.

An immediate benefit is expected to be obtained by pooling purchases of raw materials, for these ten firms are collectively equal in importance to the largest single automobile firm in France. The next almost immediate advantage is that no two of these firms will produce exactly the same type and same priced car. Where it is impossible to avoid competition there will not be more than two in any one class.

Advantages from standardization will be a little longer in coming. It has already been decided, however, that these ten manufacturers will reduce tire sizes to four. The union is now working on the standardization of electric equipment, size and type of battery, size of bolts and nuts, size of brake liners, size of steering wheels, gasoline connections, magneto bases and couplings, body dimensions and fittings, etc. There is no intention of stultifying design. Every manufacturer will be free to follow his own plans, but will at all times endeavor to work with the standards of the union.

It is quite possible that there will be a considerable exchange of finished material between these factories as work progresses. For instance, Delage now makes a piston of 88-mm. bore for a high-class 6-cylinder car. There is no reason why he should not also make the pistons for the Charron 4-cylinder car, which has the same bore. Another firm well equipped for cutting spiral bevel gears could very advantageously cut these gears for two or three other members of the group.

The buyer will be disposed to make his purchases inside this group when he realizes that most of the electrical equipment is the same for the twenty cars built by these ten firms; when he realizes that fifteen out of twenty front springs are interchangeable, that most of the ball bearings are the same size and type, that a length of fan belting will be the same from whatever firm it is bought; in a word, that he has the stocks of ten dealers at his disposal instead of one.

The designs are being worked out in common, with a view to low cost of production, and it is understood that each firm shall build the part for which it is best fitted. There will be a separate assembly plant and selling organization.

Former Ford Assistant Chief Engineer Allied with Chief Special Telegram

DETROIT, April 3—Charles Mongana, Jr., who resigned as junior assistant chief engineer of the Ford Motor Co. this week, has associated himself with his former chief, C. Harold Wills, who resigned his position as chief engineer of the company two weeks ago. It is said that Mr. Wills left the Ford organization to bring out a new car. He will neither confirm nor deny this report, but states that he will remain in the automotive business. He has opened an office in the Book Building. Mr. Mongana was with the company for seven years, and during the war was in charge of its Liberty engine operations.

A. M. Wible, who has been connected with the Ford engineering department for some time, succeeds C. Mongana.

Natural Gas Recovery Increasing Rapidly

Multiplied 28 Times in 6 Years—Solution of Fuel Problem Indicated

WASHINGTON, March 31—The recovery of gasoline from natural gas is increasing and has attained special importance as a potential solution of the gasoline problem, according to John Dean Northrop, chief of the Petroleum Division of the U. S. Geological Survey, Department of the Interior. In a pamphlet discussing this subject, Northrop states that although the recovery of gasoline from natural gas is an industry scarcely a dozen years old, still in process of growth, it has become a material contributor to the domestic supply of motor fuels. Following are excerpts from Northrop's pamphlet:

"In 1911, the first year for which statistics are available, 176 plants in nine states produced 7,425,839 gal. of raw gasoline from natural gas. In 1917, only 6 years later, 886 plants in twelve states produced 217,884,104 gal., a gain in that brief period of 403 per cent in the number of plants and of 2834 per cent in the annual output of raw gasoline.

"Prior to 1916 the greater portion of the gasoline recovered from natural gas was obtained from casing-head gas, oil-well gas, or 'wet' natural gas by methods involving compression and condensation. Much of the output came, of course, from plants specially designed and installed to recover the gasoline vapors carried by gas of that type, but a fair proportion, particularly in the Appalachian oil field, was recovered incidentally by the use of simple and relatively inexpensive condensing apparatus, connected with vacuum pumps installed to expedite the production of oil, and some was recovered as drips from gas transmission lines.

"Since 1913, however, a steadily increasing proportion of the annual output of natural-gas gasoline has been recovered by the absorption process. With the scope of the industry broadened to include practically every type of natural gas found in the United States, its growth since 1913 has been in the direction of increased capacity for production of gasoline rather than in a direction that would tend to determine what other products could be derived from natural gas by variations in the methods employed to recover gasoline."

Discussing the industry further with relation to the production in the United States, Northrop stated that the year 1917 was one of marked expansion. "The quantity of raw gasoline recovered from

natural gas in that year," states Northrop, "including that produced by compression, by absorption, and by vacuum pumps, as well as that saved as drips from gas mains, was 217,884,104 gal., a gain of 114,391,415 gal., or 111 per cent, over the output in 1916. Of this quantity 168,866,555 gal., or 77.5 per cent, was recovered by compression and by vacuum pumps and the remaining 49,017,549 gal., or 22.5 per cent, by absorption and by salvage from gas mains. The combined gasoline obtained by compression and by vacuum pumps was greater than in 1916 by 83,943,768 gal., or 99 per cent, and the gasoline obtained by absorption and from drips was greater by 30,447,647 gal., or 164 per cent.

300,000,000 Gallons in 1917

"The quantity of commercial gasoline represented by the raw gasoline in 1917, though not susceptible of accurate determination, probably amounted to more than 300,000,000 gal.

"The average price received in 1917 for the raw gasoline at the sources of production was 18.45 cents a gal., and the market value of the entire output was \$40,188,956, a gain of 4.6 cents in average unit selling price and of \$25,857,808, or 180 per cent, in gross market value, compared with 1916, which reflects the steadily appreciating value of motor fuels in the period under review.

Gasoline Recovering Plants Increase

"The volume of natural gas from which the natural-gas gasoline was recovered in 1917 amounted to about 492,000,000,000 cu. ft., and the average recovery of gasoline per 1000 cu. ft. by all methods was about half a gallon.

"The number of plants, including vacuum-pump plants, recovering gasoline from natural gas increased from 596 at the beginning of 1917 to 886 at the end of that year, a gain of 49 per cent, and the combined daily capacity of all plants increased during the same period from 495,448 gal. to 902,385 gal., or about 82 per cent."

The analysis of the natural-gas gasoline industry by states is indicated in the table below:

Natural-Gas Gasoline Marketed in the United States in 1917

State.	Number of operators.	Plants.		Gasoline produced.					
		Number	Daily capacity.	Quantity	Value.	Price per gallon.	Estimated volume of gas treated.	Average yield of gasoline per thousand cubic feet of gas.	
Oklahoma	167	234	492,436	115,123,424	21,541,905	18.71	84,719,941	1.359	
West Virginia	128	188	135,663	32,668,647	6,511,813	19.93	167,741,351	0.195	
California	45	49	99,761	28,817,604	4,438,022	15.40	45,351,247	0.635	
Pennsylvania	287	251	59,164	13,826,250	2,778,098	20.01	49,487,056	0.279	
Texas	10	11	32,550	6,920,405	1,149,441	16.61	12,677,216	0.546	
Ohio	49	61	25,137	5,439,560	1,051,376	19.33	30,062,141	0.181	
Louisiana	15	20	20,118	4,979,754	814,747	16.36	2,233,511	2.229	
Illinois	33	55	17,392	4,934,009	866,033	17.55	2,685,895	1.837	
Kentucky	5	5	13,400	3,818,209	763,186	19.99	24,915,946	0.153	
Kansas	4	6	4,642	1,174,980	241,219	20.53	9,315,339	0.126	
New York	7	6	2,122	181,262	33,116	18.27	68,154	2.659	
Colorado									
	750	886	902,585	217,884,104	40,188,956	18.45	429,287,797	0.508	

All Aerial Activities Under One Head

Director to Have Charge of Training, Supply, Administration and Information.

WASHINGTON, March 31—Army aerial activities will be co-ordinated under one head by the Director of the Air Service. The reorganization is designed to supersede the dual wartime air establishment and to develop peacetime activities. Major-General Charles T. Menoher, Director of Air Service, has assumed full charge of all the aerial activities. He has appointed an executive organization under Col. M. F. Davis, who in turn has divided the duties of the various branches into four groups, as follows: (1) Training and Operations; (2) Supply; (3) Executive and Administrative, and (4) Information, Publication and Statistics.

The Chief of the Supply Group has charge of the supplies, airplane engineering, production, procurement, inspection, maintenance and finance disbursement for the entire Air Service, including both the old branches—Aircraft Production and Military Aeronautics.

The Chief of the Information Group gathers and distributes all information, statistics and publicity. In wartime he would have charge of intelligence work for the whole Air Service.

The Chief of the Training and Operations Group directs all training and operations.

The Chief of the Administrative Group is practically the Adjutant-General of the Air Service, controlling administration and executive work, personnel, office management, the medical section, cables, correspondence, etc.

Brigadier-General William Mitchell assumed charge of Training and Operations. Colonel William E. Gilmore became Chief of Supply. Lieutenant-Colonel William F. Pearson assumed charge of Administration and Major Horace M. Hickam became Chief of Information. It is to be noted that the Supply, Admini-

stration and Information Groups exist practically for the creation and maintenance of the Training and Operation Group. The latter has at its head the ranking officer of the branch chiefs—Brigadier-General Mitchell.

Each branch chief is directly responsible to the Director of the Air Service, and in this manner the activities of the entire service are co-ordinated in and centered upon the office of the Director.

Following the overseas divisional system, the Director has designated the Supply Group as first in the organization, Information as second, Training and Operations as third, and Administration as fourth. This does not imply rank. Each chief is immediately responsible to the Director. The Director designates what action is to be taken, lays down service policies and co-ordinates the activities of all four branches.

The primary purpose of this organization is to develop the Air Service, co-operate in the advancement of commercial aeronautics, and promote the principle that the United States deserves a leading place in the air, promised by our original application of the principles of mechanical flight.

Saxon Reorganization Plan Goes Through

DETROIT, April 3—At the moment of going to press word has been received that the advisory committee handling Saxon affairs will meet immediately and declare the present stock forfeited and reorganize, according to the plan already outlined in the March 20 issue of AUTOMOTIVE INDUSTRIES. This step has been taken because of the apparent lack of interest of stockholders and the failure of repeated efforts to get them together. As already stated, this will virtually wipe out the \$6,000,000 stock of the company, and will call for an issue of \$2,000,000 in bonds, \$1,500,000 preferred stock and \$3,200,000 common. Creditors will receive common stock in return for their obligations. The committee will meet this week either here or at Chicago to take action necessary to authorize the reorganization.

The reorganization of the company will not affect production operations. The plant is turning out between 40 and 60 cars daily and orders are already two months ahead of production.

General Motors Capital Now \$370,000,000

DETROIT, March 31—The General Motors Corp., Wilmington, Del., has taken out papers at Lansing showing an increase in capitalization from \$102,600,000 to \$370,000,000. The Michigan Crank Shaft Co. of Muskegon has increased its capital from \$50,000 to \$200,000. The Union Tire Co., Detroit, has been organized with a capitalization of \$100,000. The Moto-Meter Co. of Long Island City has incorporated its Michigan branch company, with headquarters in Detroit. Capitalization figures are \$75,000. The T. W. D. Tractor Co. has been formed in St. Clair and incorporated for \$100,000.

Program for Foreign Trade Convention

To Take Up Every Phase of Foreign Trade on April 24, 25 and 26.

NEW YORK, April 3—The complete program is now ready for the Foreign Trade Convention which is to be held in Chicago, April 24, 25 and 26. The convention is to take up every phase of foreign trade, and includes such well-known experts as James A. Farrell, Hugh Frayne, Eugene Meyer, Jr., P. S. Steenstrup and others. Following is the complete program:

THURSDAY, APRIL 24

Morning

Session Topic: America's Need of Foreign Trade.

The Effect of Increased Productive Capacity Upon Our Foreign Trade—Edward Prizer, president, Vacuum Oil Co.

America's Financial Equipment for Foreign Trade—Fred I. Kent, vice-president, Bankers Trust Co.

The Interest of Labor in Foreign Trade—Hugh Frayne, War Industries Board.

The Element of Labor Cost in American Exports—William Pigott, president, Seattle Car & Foundry Co.

Afternoon

The Vital Concern of Agriculture in Foreign Trade—Charles J. Brand, Chief of Bureau of Markets, U. S. Department of Agriculture.

The Mississippi Valley and Foreign Trade—John M. Parker, president, Mississippi Valley Association.

The Bargaining Tariff—Hon William S. Culbertson, U. S. Tariff Commission.

The Stabilizing Effect on American Industry of a Definite Foreign Trade Policy—J. W. Hook, president, Allied Machinery Co. of America.

Evening

Group I. Commercial Education for Foreign Trade.

Export Technique: Job Analysis of an Exporting House, Showing What Employees Should Know—D. E. Delgado, export manager, Eastman Kodak Co.

Cultural Equipment for Foreign Trade—John F. O'Hara, C.S.C., Notre Dame University. Vocational Education for the Business of Exporting—R. S. MacElwee, assistant chief, Bureau of Foreign and Domestic Commerce.

Report of Foreign Trade Training Survey of U. S. Bureau of Education—Glen Levin Swiggett, specialist in Commercial Education, U. S. Bureau of Education.

Group II. Foreign Trade Merchandising. America's Foreign Commerce and the Necessity for Co-operation of All Interests to Protect It—W. H. Douglas, president, Arkkell & Douglas, Inc.

The American Foreign Trader—John F. Fowler, vice-president, W. R. Grace & Co. Can American Fabricated Products Hold Foreign Markets?—Wm. E. Peck, president, W. E. Peck & Co.

The Mechanism of Foreign Trade—Wm. H. Knox, president, Wm. H. Konx & Co.

Group III. Financing Foreign Trade. Financing Our Excess of Exports—Eugene Meyer, Jr., managing director, War Finance Corporation.

Acceptances in Foreign Trade—D. C. Wills, Federal Reserve Bank, Cleveland.

American Branch Banks Abroad—James H. Carter, vice-president, National City Bank.

Foreign Exchange—J. McCurrach, vice-president, Continental and Commercial National Bank.

Group IV. Advertising for Foreign Trade. Survey and Method—F. A. Arnold, manager, Foreign Department, Frank Seaman, Inc. Media—Stanley Resor, president, J. Walter Thomson Co.

Foreign Advertising Successes—W. G. Hildebrandt, Gotham Advertising Company.

Discussion—J. W. Helburn, Tanners Council of U. S. A.

FRIDAY, APRIL 25

Morning

Session Topic: The American Merchant Marine.

American Shipbuilding—Homer L. Ferguson, president, Newport News Shipbuilding and Drydock Company.

The World's Merchant Fleets To-day—W. S. Tower, Division of Planning and Statistics, U. S. Shipping Board.

The Future of the American Marine on the Pacific—Frederick J. Koster, president, San Francisco Chamber of Commerce.

The Relation of Law to the Development of Our Merchant Marine—Ernest J. Baldwin of the New York Bar.

The Relation of Inland Waterways to Foreign Trade—James E. Smith, president, Mississippi Valley Waterways Association.

Afternoon

Group V. Foreign Credits and Credit Information.

What Part Must Credit Play in the Expansion of Our Foreign Trade—E. D. Fisher, vice-president, Bank of Detroit.

Some of the Peculiar Difficulties and Problems in Foreign Credit Granting—F. D. Rock, credit manager, Armour & Co.

In What Form and Manner Can Exporters Co-operate for Developing Foreign Credit Information—H. F. Beebe, Winchester Repeating Arms Co.

What Assistance May the Government Give Exporters in Selecting Safe Foreign Credit Risks—E. E. Pratt, vice-president, Overseas Products Corporation.

Group VI. Direct Selling and Representation. Direct Selling in Europe: Larger Nations—; Smaller Nations, H. S. Demarest, general export manager, Green-Tweed Company.

Direct Selling in South America—P. S. Steenstrup, General Motors Export Company.

Direct Selling in the Orient—Howard E. Cole, Standard Oil Company of New York.

Direct Selling Through the Parcel Post—Maynard D. Howell, export manager, Montgomery Ward & Co.

Group VII. Export Combination—The Webb Law in Operation.

The Webb Law in Operation—John Walsh, chief counsel, Federal Trade Commission.

(Continued on page 768)

AUTOMOBILE, TRUCK AND PARTS EXPORTS FROM NEW YORK FOR FEBRUARY

	Cars			Trucks	
	No.	Value	No.	Value	Value
Argentina	202	\$300,323	4	\$8,130	\$38,287
Australia	195	221,445	16	15,678	55,208
Barbadoes	3	2,499	..	..	159
Belgium	3	12,400	..	..	1,710
Bolivia	..	..	..	..	536
Brazil	121	148,673	5	9,765	87,869
British East Africa	1	982	..	..	271
British East Indies	..	..	..	..	10
British Guiana	2	1,025	..	..	992
British India	43	56,633	6	11,700	60,015
British South Africa	126	146,316	4	18,544	80,166
British West Indies	1	595	3	1,650	2,547
Chile	55	138,065	2	5,672	50,685
China	54	82,539	17	42,400	11,020
Colombia	3	2,301	..	..	3,904
Cuba	88	84,729	8	29,363	67,387
Danish West Indies	..	..	1	3,350	74
Denmark	36	48,289	5	13,035	4,653
Dutch East Indies	3	9,000	..	..	2,932
Dutch Guiana	..	..	..	..	41
Dutch West Indies	4	2,151	..	..	250
Ecuador	2	2,754	..	..	2,242
Egypt	..	..	..	..	5,917
England	2	2,236	9	14,247	705,419
France	82	281,131	510	2,291,595	203,788
French Africa	1	800	..	..	8,547
French East Indies	13	14,256	..	..	..
French West Indies	2	2,151	1	1,800	3,660
Greece	21	38,906	10	25,720	23,949
Guatemala	..	..	..	..	117
Haiti	21	22,344	1	550	930
Honduras	..	..	..	..	785
Hongkong	22	23,710	15	17,352	772
Ireland	..	..	..	..	304
Italy	1	1,500	1	2,731	500
Jamaica	1	1,000	..	..	4,716
Japan	107	153,573	104	144,573	6,952
Mexico	10	11,961	1	900	9,163
Netherlands	..	..	..	..	190
Morocco	..	..	..	..	6,121
Newfoundland	5	5,779	..	..	103
New Zealand	105	105,731	24	38,382	61,158
Nicaragua	2	1,725	..	..	1,937
Norway	26	28,874	31	75,775	7,271
Panama	6	6,150	1	550	5,544
Peru	77	147,961	4	10,540	18,634
Philippine Islands	36	31,266	5	4,611	3,494
Portugal	2	3,500	..	..	2,098
Portuguese Africa	..	..	..	..	134
Salvador	7	9,346	..	..	598
Santo Domingo	..	..	..	..	1,627
Siam	18	14,530	..	..	374
Spain	36	43,665	1	1,145	9,497
Straits Settlements	1	1,000	5	11,250	15,048
Trinidad	9	5,670	6	3,300	7,163
Turkey in Asia	10	6,978	..	..	2,756
Turkey in Europe	..	..	59	97,305	13,026
Uruguay	25	38,106	1	1,070	17,621
Venezuela	24	27,346	2	1,360	10,920
	1,646	\$2,315,790	874	\$2,921,399	\$1,632,585

Big Gain in February's New York Exports

An Increase of More Than 60 Per Cent Over January Totals

NEW YORK, April 2—Although the new year started well with big figures for the month of January, February automotive exports from the port of New York show another substantial gain in number and value of cars and trucks and in value of parts.

Totaling the various items for January gives \$4,274,827. The total for February is no less than \$6,870,057, an increase of over 60 per cent. January exports of cars numbered 1047, valued at \$1,480,832; 515 trucks, valued at \$1,604,418, were shipped, and the value of parts was represented by \$1,189,577. The totals for the corresponding items for February are given at the foot of the table on this page.

Belgium appears as a purchaser again, after a long lapse, and business appears to be opening up with Turkey (both European and Asiatic). Both Japan and China show evidence of increasing business, and France has taken considerably more than half the truck total.

Earnings of Overland Set Record

To Concentrate on Small Four Poppet Valve and Medium-Price Knight Car

TOLEDO, April 2—The profits of the Willys-Overland Co. for the year ending Dec. 31, 1918, amounting to \$11,510,645, were the largest in the history of the company. The net income after deducting all charges and taxes amounted to \$5,536,254, which is equivalent, after paying preferred dividends, to \$2.54 a share earned on the common stock as compared with \$3.16 earned in 1917. The reduction is due to writing off \$3,775,642 pending government settlements, and \$1,000,000 from the investment in the Curtiss company.

The report states that all passenger car production had ceased on Nov. 1, 1918, and adds that the manufacturing plans for the coming year will be based upon a complete standardization of models and concentration on but two types. One of these will be the small four-cylinder car and the other will be a new Knight-engined car in the medium-price field. Following is the complete report:

Operating at 80 Per Cent War Basis

The express determination of the Willys-Overland Co. to shape its production program throughout 1918 to the winning of the war inevitably entailed the early acceptance on a large scale of a wide variety of Government contracts, the result being that on Nov. 11, when the armistice was signed, the company had on hand \$75,000,000 of Government business. The factories were then operating on an 80 per cent war basis with 100 per cent set for the end of the year.

The cancellation of the bulk of the war work, which had involved the most radical factory adjustments, the creation of special departments, the changing over of equipment, and the preliminary expenditure of over \$12,000,000 in preparation for the urgently desired large scale production, necessitated another sweeping readjustment to a normal peace basis. Its rapid and successful accomplishment has been a splendid tribute to the flexibility of the company's plants and organization.

All passenger car production had ceased Nov. 1, 1918. By Jan. 2, or within less than 50 days after "stop-work" instructions on war contracts, we were again turning out automobiles and by Jan. 31 were shipping 315 cars daily. At the present time 425 cars are being turned out daily, in accordance with a schedule calling for a steady increase in output to 1000 cars daily in August.

Notwithstanding the retarded start in automobile production caused by the delay in settling the status of the Government contracts, it is expected that the 1919 output will reach 175,000 cars, or over twice the war-depleted 1918 production, and exceeding by 25 per cent the company's best year. First hand reports of dealers and distributors evidence a steadily increasing demand for cars, each succeeding month of the new year having thus far recorded a striking gain in sales over the previous. In proportion to the supply, the demand for cars was probably never greater than to-day.

The manufacturing plans for the coming year represent a complete standardization of models and concentration upon but two types, viz.—a light four-cylinder car for the low-priced field, and a new Knight-engined car for the medium field. The elimination of the superfluous types will permit of production commensurate with the company's plant capacity and through the lowering of manufacturing costs will result in increased profits. Consolidation of manufacturing in two models for the principal selling fields will further entrench the company in its position in the industry.

In September, 1918, the company, anticipating, regardless of war or peace, an almost unlimited demand for tractors in an age of power farming, acquired the control of the Moline Plow Co., manufacturers of

agricultural implements and of the Moline-Universal tractor. The purchase enabled the immediate application of our immense plant facilities and large scale production methods to a proven tractor, and afforded the best and quickest way to attain a lead in this manufacturing field.

The Moline Plow Co. output this year will be double and in 1920 doubled again. Its acquisition has resulted in the permanent solidification and broadening of our production base.

Adjustments with the United States and British governments on war contracts are progressing somewhat slowly but satisfactorily.

The increase in the item of investments in and advances to other companies is represented mainly by the Moline Plow Co. common stock and by advances to subsidiaries.

Profits of \$11,510,645 Greatest in History

The company's profits last year after allowance for taxes, \$11,510,645, were the largest in its history, but it was felt that under present conditions conservatism should dictate their disposition. Accordingly deduction for depreciation, accruing renewals and tool replacements has been made to the extent of \$3,775,642. In addition it was deemed wise to write off, pending Government settlements, \$1,000,000 from the investment in the Curtiss Aeroplane & Motor Corporation.

The outlook for the automobile and the farm tractor industries was never brighter. With war conditions and restrictions past, I anticipate a year of activity and expansion. Both our production and financial programs, though conservative, have been made with this view in mind.

	1918	1917
Net earn. after taxes	\$11,510,645	\$10,193,490
Depreciation, etc.	2,457,842	1,330,798
Tool replacements	1,317,800	1,030,000
Written off	*1,000,000	†559,940
Interest	1,198,748	1,151,208
Balance	\$5,536,254	\$6,121,543
Preferred dividends	1,315,634	1,138,341
Pfd. stock redemption	554,208	450,000
Common dividends	1,626,891	4,885,237
Common stock divs.	.....	1,965,991
Surplus	\$2,039,501	\$2,318,026
Premiums	.....	.....
Previous surplus	24,301,384	27,596,594
Total surplus	\$26,340,885	\$25,278,568
Written off	.....	74,213
Development exp.	.....	902,941
Profit and loss surp.	\$26,340,885	\$24,301,384

*Written off book value of investments.
†Parts of discontinued models written off.
‡Deficit.

Another Rumor Dies

NEW YORK, April 3—To-day a rumor was afloat on Automobile Row that the parties who recently bought the Bosch Magneto Co. from the Alien Property Custodian had sold it, cleaning up \$1,000,000. Inquiry at the Bosch factory in Springfield, Mass., brought forth smiles at the amount involved and indignation that the company should be the subject of such rumors. Sales Manager Alfred H. Bartsch stated that the factory is operating at capacity, that a dividend has just caused an increase of a couple of points in the stock and that there is absolutely nothing to the rumor.

Schumann Joins General Motors

NEW YORK, April 2—John J. Schumann, Jr., has accepted the position of assistant financial manager of the General Motors Acceptance Corp., the subsidiary of the General Motors group formed to finance its dealers. He was executive secretary of the distribution committee and assistant director of distribution of the Liberty Loan Committee for the Second Federal Reserve District, and his services with the Government loan organization are being volunteered by the corporation.

White Sales Increase 53 Per Cent in 1918

Profit and Loss Surplus Slightly Reduced, Due to Larger Federal Taxes

CLEVELAND, April 2—Gross sales of the White Motor Co. increased 53 per cent in the year ended Dec. 31, 1918, over sales for 1917, the increase being \$13,810,348. After deducting Federal income, war and excess profits tax, the profits for the year were \$6,380,585. A further deduction for Federal income, war and excess profits tax, estimated at \$3,700,000, and dividends of \$1,280,000, leaves a balance for the year 1918 of \$1,400,585. This compares with \$2,520,308 in 1917. The decrease is caused by the larger Federal taxes.

The annual report of the company points out that the financial condition at the end of the year was excellent. Production was, of course, largely influenced by the requirements of the war. In addition to a largely increased commercial demand, which, however, it was necessary to curtail because of the war, sales included 6451 trucks for the United States and French governments as against only 1358 trucks which were produced for war purposes in 1917.

The company has sold in all to the Allied nations, including the United States, nearly 18,000 trucks at a valuation of over \$52,000,000. At the time the armistice was signed there were, in addition to these, 5700 trucks on order with a valuation of approximately \$16,000,000, which were canceled.

Following is the consolidated income account of the White company and its subsidiaries for the year ended Dec. 31, 1918:

	1918	1917
Operating profit	*\$5,947,494	\$4,494,749
Other income	433,091	335,559
Total income	\$6,380,585	\$4,830,308
Federal taxes	3,700,000	1,030,000
Reserve	.....	.....
Balance	\$2,680,585	\$3,800,308
Dividends	1,280,000	1,280,000
Surplus	\$1,400,585	\$2,520,308
Previous surplus	5,216,301	2,541,041
Adjustments	4,590	154,951
Profit and loss surp.	\$6,621,476	\$5,216,300

*Operating profit, after deducting manufacturing, selling and other expenses.

	Assets	1918	1917
Prop. account	\$4,902,978	\$4,235,380	
Good will, pat., etc.	5,388,910	5,388,910	
Inventories	10,156,558	9,638,129	
Accounts receivable	5,422,498	3,629,589	
Notes receivable	1,011,520	1,499,185	
Cash	817,653	698,600	
Government securities	1,886,800	125,448	
Emp. unpaid bond sub.	466,652	.....
Investments	240,000	240,000	
Miscellaneous accts. rec.	42,373	.....
Deferred assets	117,870	118,296	
Total	\$30,453,812	\$25,573,537	

	Liabilities	
Capital stock	\$16,000,000	\$16,000,000
Notes payable	1,000,000	300,000
Accts. payable, etc.	2,298,060	2,118,212
Deposits on cars	62,058	104,589
Accrued taxes	32,218	64,435
Deprec. reserve	.....	.....
Conting. reserve	740,000	740,000
Tax reserve	3,700,000	1,030,000
Surplus	6,621,476	5,216,301
Total	\$30,453,812	\$25,573,537

U. S. Rubber Profits \$16,072,042

**Earnings Establish New Record—
\$30.81 on Common, Against
\$28.77 in 1917**

NEW YORK, April 2—The U. S. Rubber Co. accumulated a net profit of \$16,072,042 during the year ended Dec. 31, 1918, thereby establishing a new record in the history of the company. This profit is after the deduction of federal taxes, interest and dividends amounting to approximately \$28,251,000 and is equal to \$30.81 a share on the \$36,000,000 of common stock as compared with \$28.77 earned in 1917.

Sales increased from \$176,159,694 in 1917 to \$215,398,425, or \$39,238,731. Net profits increased \$1,731,465, and the surplus is \$4,144,098 higher than it was in 1917.

In a statement accompanying the annual report, Col. Samuel B. Colt, chairman of the board of directors, says: "In refunding our indebtedness under our first and refunding mortgage, as set forth in the annual report presented March 20th, 1917, all outstanding issues were provided for at that time in cash except \$9,000,000 of debentures of the

The consolidated income account of the United States Rubber Co. for year ended Dec. 31, 1918, compares as follows:

	1918	1917	1916
Tot. sales...	\$215,398,425	\$176,159,694	\$126,759,129
Costs, etc...	169,594,286	144,916,641	110,962,739
Op. Profits...	\$45,804,139	\$31,243,053	\$15,796,389
Other inc...	.....	.....	2,442,815
Total inc...	\$45,804,139	\$31,243,053	\$18,239,204
Disc. allow...	5,443,461	4,416,943	2,733,105
Bad debts...	880,046	607,529	314,444
Prof. on s/s...	\$39,480,632	\$26,218,581	\$15,191,655
Chg. Fed. tax...	19,289,535	7,760,147	1,275,895
Inc. credits...	.....	.....	.....
Interest...	4,119,055	3,177,857	3,517,565
Net profit...	\$16,072,042	\$15,340,577	\$10,398,195
Pfd. divs...	4,961,992	4,961,370	4,835,844
Com. divs...	.....	.....	.....
Sub. co. divs...	19,510	20,092	119,238
Surplus...	\$11,090,540	\$10,358,515	\$5,443,113
Prev. sur...	31,891,207	28,479,134	22,962,322
Total sur...	\$42,981,747	\$38,837,649	\$28,405,435
Adjustments...	1,133,696	6,946,442	73,700
P & L sur...	\$41,848,051	\$31,891,207	\$28,479,135

Consolidated balance sheet of the United States Rubber Co., as of Dec. 31, 1918, compares as follows:

ASSETS

Plants &c...	\$134,886,551	\$128,105,826	\$130,187,629
Inventory...	70,704,226	72,440,170	48,530,398
Cash...	12,330,287	9,463,833	10,123,709
Notes rec...	1,627,473	2,056,906	1,764,000
Accts. rec...	35,566,177	36,313,607	26,052,706
Securities...	6,494,433	7,937,920	3,481,655
Skrg. fd. cash...	.....	509,852	.....
Divd. assets...	1,282,303	1,257,519	1,716,620
Total...	\$262,891,450	\$257,575,781	\$222,366,569

LIABILITIES

1st pfd. stk...	\$61,722,200	\$61,722,200	\$60,773,600
2d pfd. stk...	403,800	403,600	403,800
Com. stock...	36,000,000	36,000,000	36,000,000
Sub. co. stk...	284,000	320,655	376,580
Bonds...	68,600,000	71,600,000	36,807,000
Accts. pay...	14,852,945	8,548,084	6,526,168
Drafts pay...	942,263	1,877,676	1,891,093
Accrd. tax &c...	.....	5,249,719	801,527
Notes pay...	9,465,350	19,430,955	26,708,866
Miscel. res...	9,142,779	4,874,021	1,300,329
Deprec. res...	11,680,389	7,707,891	5,000,000
Div. res...	1,240,498	1,240,498	1,223,040
Fixed sur...	6,709,275	6,709,275	15,080,231
Surplus...	41,848,051	31,891,207	28,479,135
Total...	\$262,891,450	\$257,575,781	\$222,366,569

General Rubber Co., which fell due December 1, 1918, and \$2,600,000 of bonds of the Canadian Consolidated Rubber Co., Limited, which will fall due in 1946, for refunding which an equivalent amount of first and refunding mortgage bonds was reserved.

"Provision was this year made to take up the debentures of the General Rubber Co. when they fell due, through an issue of \$6,000,000 of 7% five-year gold notes of this company, secured by \$9,000,000 of our first and refunding mortgage bonds which were issuable for that purpose. The balance to take up those debentures was provided from our current resources.

"The financial condition of the company is strong, as indicated by the consolidated general balance sheet. With the continually expanding business and present high prices of materials, more working capital is required, in addition to which extensions have been planned, especially in the tire division, which will consume a large amount of money.

"Although the past year's earnings considered by themselves would warrant a dividend upon the common stock, your directors felt that it would not be prudent to pay one on account of the uncertainties which existed in business, and the company's cash position.

"Inventories of manufactured goods and materials have been taken on a conservative basis, having in mind the decline in values as a consequence of the closing of the war.

"The plants and properties have been maintained in the highest state of efficiency and adequate charges for depreciation have been made.

"The export sales outside of war orders were maintained during the year, and with the close of the war your directors believe there is a greater opportunity offered in this field than ever before and preparations are being made to materially extend our export business.

"The operating divisions of the company are now under the direct charge of the president. The president presides at the meetings of the operating council and reports their recommendations to the Executive Committee, of which body he is also a member. Greater directness and efficiency are thus obtained.

"The volume of business of our company so far this year has been somewhat in excess of the same period of last year, and though we look for a falling off in certain lines, especially those where war orders were large, now that we are on a peace basis, the present indications are that our volume for 1919 will be satisfactory."

Lee Increases Directorate

NEW YORK, March 31—At the annual meeting of the Lee Rubber & Tire Corp. John M. Dettra, secretary of the company, was elected a director to fill the vacancy caused by the resignation of James W. Johnson. The retiring directors were re-elected. It was voted by the shareholders to increase the number of directors from nine to eleven, and J. C. De La Cour, vice-president and treasurer of the W. C. Schull Co., Camden, N. J., and H. C. Jones, president of the H. C. Jones Co., Conshohocken, Pa., will be added to the board as soon as the legal formalities are complied with.

John J. Watson, Jr., president, stated that the reason for increasing the board was that the management hoped to merge the Lee Tire & Rubber Co. of Pennsylvania, the operating company, and the Lee Rubber & Tire Corp. of New York, the holding concern, thereby eliminating duplication of accounts and also bringing about a saving on tax payments. Messrs. De La Cour and Jones are directors of the operating company.

The output of tires last year was 225,000 compared with 244,000 in 1917, and this year plans call for 250,000. According to the general manager, the labor situation has improved. The plant at present employs about 750 men.

Production Nearing Normal

Michigan-Ohio Plants Produced 5741 Cars Daily in March—4822 in February

DETROIT, April 1—Production in the States of Michigan and Ohio is approaching to near normal figures. During the month of March the daily output of 32 factories was 5741 passenger cars. This is a big gain over February, during which month 4822 automobiles were produced daily.

In the month of January, when the majority of the plants were just getting into commercial manufacture on greatly curtailed schedules, 2984 machines were built. The average daily production for the first quarter was 4467 cars.

Manufacturers are now beginning to talk in terms of annual production. A large number of the companies have drafted production schedules for 1919. Others, while outlining production for the year, are not making figures public.

This increase will be very noticeable during April. Packard will be in production. This company has put through its first car. Hudson will double its Hudson and Essex production. Buick hopes to attain the 600 daily production mark. Willys-Overland will be getting into production on its new light car. Oldsmobile and Reo propose big production increases. Studebaker is running up production approximately 40 per cent a month, while Ford will be hitting the 3000 mark. All the smaller concerns, many of them not in full swing as yet, will increase their output materially.

In 1918 car production figures were 1,044,754, as against 1,737,151 the previous year. In 1916 production was 1,493,617 cars. Normally the output increases at the rate of about 40 per cent a year. Had this rate prevailed last year the output would have been 2,750,000 cars, or more than double what it actually was. Because 90 per cent of the companies were on war work and started the year under a great handicap, many production experts declare remarkable results will have been obtained if 1919 figures exceed the 2,000,000 mark.

Some of the Detroit companies are having trouble getting material and parts. This is not true in all cases, but in a number of instances it is curtailing production. The trouble seems to be due to the inability of certain parts makers to get back into peace production.

Firms dealing with these concerns are therefore affected, while others are not. Lack of funds owing to unadjusted Government contracts and the instability of the steel market are the big factors at the bottom of this trouble. The fixing of steel prices by the Government is now relieving this situation, as this market is gaining confidence again, even if the prices are a little high to suit the majority of the buyers.

For a few days following the fixing of the steel price by the Government the trade was uncertain and continued its

hand-to-mouth buying policies. Now, however, the companies are beginning to purchase steel in larger quantities. The immediate effect of the fixing of the price so far as the automotive industry is concerned was the stimulus it gave building operations. A number of plants have placed orders for structural steel and there is going to be a healthy increase in factory construction this summer.

Daily production figures for the first quarter of the year, together with the proposed annual output of Michigan and Ohio automobile plants, follow:

Car	Jan.	Feb.	March
Buick	100	400	450
Briscoe	30	50	50
Barley		4	10
Cadillac	55	60	80
Chalmers	30	65	70
Chandler		50	90
Chevrolet		300	350
Columbia	8	10	15
Dodge	300	375	400
Dort	40	65	70
Ford	1,300	2,000	2,400
Harroun	4	4	10
Hudson	30	50	50
Hupp	38	55	65
King		4	10
Liberty	15	15	25
Maxwell	150	150	220
Monroe	5	5	8
Oakland	160	160	200
Olympian	4	5	10
Oldsmobile		110	140
Overland	320	400	442
Packard			1
Paige	50	50	55
Paterson	10	10	10
Jackson		100	125
Reo	100	100	125
Saxon	10	50	65
Scripps-Booth	20	40	45
Studebaker	150	150	175
Essex	30	50	50
Grant	25	35	50
Total daily production	2,984	4,822	5,741

McFarland Back at His Desk

DETROIT, March 31—J. W. McFarland, purchasing agent of the American Auto Trimming Co., who has been at the Rock Island arsenal for some time in charge of purchases of leather and saddlery, has returned to Detroit and resumed his duties.

Program for Foreign Trade Convention (Continued from page 765)

Forming an Export Association. Discussion—William T. Nardin, American Canners' Export Association; E. E. Judd, American Webbing Manufacturers' Export Corporation; R. R. Fox, Simonds Mfg. Co. Group VIII. Ocean Service. Marine Insurance—Benjamin Rush, president, American Foreign Insurance Association. Improved Port Service and Foreign Trade—R. A. C. Smith, New York. Freight Forwarding for Export—W. J. Riley, export manager, Judson Freight Forwarding Company. Inland Traffic Management for Export—Andrew Young, traffic manager, American Sheet & Tin Plate Company.

FRIDAY, APRIL 25

Banquet, Congress Hotel, Gold Room. The Relation of Diplomacy to Foreign Trade—Hon. Breckinridge Long, Third Assistant Secretary of State. The Meaning of Foreign Trade to the Middle West—Hon. Frank C. Lowden, Governor of Illinois. American Maritime Policy—James A. Farrell, chairman, National Foreign Trade Council. The Future of Our Foreign Trade—Edward N. Hurley, chairman, U. S. Shipping Board.

SATURDAY, APRIL 26

Packing for Export—Captain H. R. Moody, Q. M. C., U. S. A.

Industry Was Ready for 100% War Work

Fully Equipped on Jan. 1—Gain of 250 Per Cent in Orders in First Half of 1918

WASHINGTON, March 29—That the automotive industry was fully prepared to enter into an almost 100 per cent war program by Jan. 1, 1919, and had increased its war orders more than 250 per cent in the first 6 months of 1918, is shown in figures made public to-day by the Department of Commerce, which took a census last year of the steel and iron on hand, consumed and required by the automotive industry. This census was taken as a war measure.

The industry on Sept. 1, 1918, had on hand 288,819 tons of steel, not including 13,406 tons of scrap steel. The 590 concerns reported also that the consumption of steel from Jan. 1 to June 30, 1918, totaled 637,707 tons, of which 142,094 were used for government contracts. This does not include 41,371 tons of scrap iron and steel, of which 6225 tons were used for government orders. Requirements estimated for July 1 to Dec. 31, 1918, were placed at 627,137 tons, of which 356,422 tons were intended for government orders. In addition 38,764 tons of scrap iron and steel were needed, of which 25,783 were for government purposes.

The preparation for increased war work is consequently noticeable in the increase of steel for war purposes; 142,094 tons, 20 per cent of the total amount, was used in the first 6 months for war orders as being compared with 356,422 tons, 55 per cent of the total amount being estimated for war orders for the last half of the year.

Two New Caterpillars

PEORIA, March 31—The Holt Mfg. Co. has brought out two new Caterpillar farm tractors—one a 5-ton 4-plow machine and the other a 1-ton 8-plow machine. In general design they are practically the same as previous Caterpillar models, but have been slightly altered and refined as a consequence of the company's experience in building war automotive apparatus.

Both models show external evidence of military influence in their automobile style hoods. The seat is more comfortable and is located so as to give the driver a view both of the field ahead and of the work of his implements. The belt pulley is placed at the rear. The lubrication system has been improved.

The 4-plow model is equipped with a 4-cylinder modified Class B Liberty truck engine in which the bore and stroke are 4 1/4 x 6 in. Ignition is by high-tension magneto and lubrication by a pressure system through a drilled crankshaft with a bypass feed to the rocker arms and return to the crankcase; a standard type of centrifugal governor, fully inclosed and sealed, is fitted. Provision is made for mounting an electric lighting gen-

erator and starting motor. The Master clutch is a dry, multiple disk type, transmitting the drive through a standard 3-speed and reverse gearset of selective type. Drive is through a pair of bevel gears with two spur-gear reductions from the steering clutch to the track drive sprockets. There is no differential and steering is effected through steering clutches independently operating the tracks. Speeds are 1.3, 2.6, 4.9 m.p.h. ahead and 0.97 m.p.h. reverse.

The 8-plow machine has a 4-cylinder, vertical 6 1/2 x 7-in. engine, all the other units being of similar design and differing only in size. Speeds are 1.35, 2.52, 3.88 m.p.h. ahead and 1.0 m.p.h. reverse. The overall length is 146 in. and the weight 18,600 lb. The overall length of the 5-ton machine is 124 in. and the weight 9400 lb.

Five Tractor Demonstrations in New York

ALBANY, N. Y., April 3—The State of New York is contemplating five tractor demonstrations during the coming season, all of which will be staged directly for tractor manufacturers and not for dealers and distributors as entrants. The exact dates of these demonstrations have not been scheduled as yet. The plan is to have 2-day demonstrations so that there will be one or perhaps more devoted to plowing and the second day for fitting. The two days will give a better opportunity of obtaining accurate records of performance than the acre or hour tests of last year.

The demonstrations will be divided over the State, with one for the western section, which probably will be in the vicinity of Batavia; one in the central will be held at Syracuse, and will have to be at the same time as the State Fair. This would not be so important a demonstration from the standpoint of performance but would be more in the nature of an exhibit. One would be in the eastern portion of the State, possibly in the area of Hudson; the fourth would be held in southern New York State in the vicinity of Elmira, and the fifth in the northern portion of the State in the zone of Malone or thereabouts.

The State of New York at present owns 70 tractors, and during the past winter established three repair depots, where these tractors were all overhauled. These were in Syracuse, Ithaca and Albany.

Restrictions Lifted on Canadian Imports

OTTAWA, ONT., March 29—Restrictions on the importation of automobiles into Canada have been lifted. It will be remembered that the Canadian Government, during the war, decreed that no cars for pleasure purposes that cost more than \$1,250 should be imported into Canada. Later it was permissible to bring in a more expensive car under a special license granted by the government.

The War Trades Board of Canada has now approved a general license permitting the importation of all commodities restricted during the war except food-stuffs.

English Tractor Trials in Fall

To Be Held by Motor Mfrs. and Traders—Royal Agricultural Society Plans for 1920

LONDON, March 17—Recently the Royal Agricultural Society of England, the oldest body of the kind in the world, considered associating with the Society of Motor Manufacturers and Traders in promoting a trial of tractors and plows at a date suitable to British manufacturers on the resumption of their normal output after the cessation of war work. The R. A. S. E., however, demurred to the proposal of the tractor side of the trade—which in this instance largely represents imported or assembled tractors and plows—that the trial should be held this year, so the S. M. M. & T. decided to carry out a trial of its own. The event will be held next September in the neighborhood of Lincoln, one of the chief arable areas.

The R. A. S. E. notifies that it will organize trials of tractors and plows in the autumn of 1920, the date not yet being disclosed. There will be six classes of entries, four confined to internal combustion engines. In each class there will be awards of medals and cash prizes. There will be a class for tractors up to 30 hp. capable of plowing three 10 x 6 in. furrows, and another for more powerful tractors which will be required to plow four 10 x 8-in. furrows. There will also be a class for self-propelled plows of any power.

There is a separate class for direct-hauling steam tractors, and two classes for double-engine cable sets of the steam and internal combustion class respectively.

Resta Will Drive Sunbeam at Indianapolis

PARIS, March 22—Daria Resta, according to a statement from the Sunbeam factory at Wolverhampton, England, has taken up the exclusive agency for Sunbeam cars in America. He will drive the second Sunbeam at Indianapolis vacated by the death of Joseph Christiaens.

The accident which caused the death of Joseph Christiaens is almost inexplicable. Christiaens left the factory on the Indianapolis racer, and when 300 yards away, and on second gear, the car skidded, a tire burst and the machine swung right around. It charged a low wall and turned over, pinning Christiaens beneath it. Death was instantaneous. The steering gear of the car was found to be in perfect condition after the accident.

More Foreign Entries for Indianapolis

PARIS, March 14—Daria Resta will doubtless secure the Sunbeam car which should have been driven by Joseph Christiaens at Indianapolis. The first car will remain in the hands of Jean Chas-

sagne. There is a possibility of the Sunbeam company preparing a third car for this race. The name of the driver is not announced.

Arthur Duray is endeavoring to secure one of the Nagant Grand Prix racers which have been hidden away in Belgium for the last 4 years. These cars, which are on the Peugeot lines, were built for the 1914 French Grand Prix. They returned to Belgium after this race, and when war broke out they were so cleverly concealed that the Germans never were able to find them although they searched for them for 4 years.

André Boillot, the youngest and only surviving brother of Georges, will come to Indianapolis this year. Young Boillot counts on getting a 150 cu. in. Peugeot which is in the hands of private owners at the present time. This car is being worked on now, and if finished by April 15 Boillot will bring it to America and start in the Indianapolis race. With only half the cylindrical capacity of his rivals he has not much hope of winning first prize, but he believes that on a distance of 500 miles he can get within the prize money.

No Shows for Italy in 1919

TURIN, March 15—The Italian Automobile Manufacturers' Association has decided to hold no motor shows in Italy during 1919. This decision has been made to give every opportunity to the industry to get back from a war to a peace basis. It is probable, however, that the leading Italian makers will exhibit at the Paris and London shows to be held towards the end of the year.

Japanese Importer Studying Conditions Here and Abroad

NEW YORK, March 29—S. Umemura, of the Japanese automobile importing firm of Yanase & Co., Tokyo, Japan, has recently arrived in this country to make a study of automobile conditions here. Mr. Umemura will sail on April 5 on the *Aquitania* for England, and before returning he will also visit France, and, if possible, Germany. Yanase & Co. represent the General Motors Co. in Japan.

National Highway System for Japan

WASHINGTON, March 31—The Japanese Government plans a system of national highways to connect up all parts of the country. Two Japanese engineers, Mr. Makino and Mr. Zhalakeyma, have been sent to this country to study road administration, and are working with the Highways Industries Association. It is quite likely that Japan will create some form of national highway supervision and control similar to the Federal Highway Commission which is planned in this country under the Townsend bill.

Can Ship to Trinidad

WASHINGTON, March 31—Embarcations against the importation of automobiles, motor trucks and motorcycles into Trinidad and Tobago, West Indies, have been lifted, and these commodities may now be imported freely.

French Tractor Trial Entries

America, France and England Will Be Represented—Automobile Firms Demonstrating

PARIS, March 22—America, France and England will be represented at the official French tractor trials to be held at Saint-Germain, near Paris, from March 30 to April 6. The Ministry of Industrial Reconstruction and the French Agricultural Tractor Syndicate are jointly responsible for these trials, which, it is believed, will become the only official test of their kind to be held in France.

It is evident from the list of entries that European automobile firms are interesting themselves in the agricultural tractor, for, among the new machines to be demonstrated by automobile firms, are Renault, Delahaye, De Dion Bouton, Tourand-Latil, Schneider and Paris General Omnibus Co. The English participant is the Austin tractor, which was shown for the first time in France at the recent Lyons fair. Among the American machines are: Cleveland, Titan, Case, Avery, Moline, Fordson, Rip, American, Pidwell and Butterosi. In all sixty machines will take part.

Dirigible Service from Europe to Buenos Aires

WASHINGTON, March 31—Aerial traffic between Europe and Buenos Aires will be a reality within a few months when the Vickers Co. of London inaugurates a regular route between these two points by dirigible. It is expected that the airship will have a capacity for about 15 passengers, and will make the voyage in 6 days by way of Spain and Brazil.

U. S. Airplanes to Czechoslovakia

WASHINGTON, March 31—The sale of military airplanes and equipment, which was announced last week in AUTOMOTIVE INDUSTRIES, was a sale made by this government to the Czechoslovak military authorities of airplanes and airplane accessories, including \$319,000 worth of planes and \$600,000 worth of equipment.

The \$319,000 worth of airplanes were 25 L. W. F. planes equipped with Sturtevant 5-A engines. The \$600,000 worth of airplane equipment was 392,112 Chinese Dogmats (used for lining leather coats worn by aviators) sold to the H. E. Lazarus Co., New York.

Automobile Traffic of Central America

WASHINGTON, March 29—The selling of automobiles in Central America is limited by the absence of good roads, according to a report received by the Department of Commerce. Even in the capitals the streets are rough and the distances short, prohibiting increased use of cars. Consequently road building holds forth a promise for increased use of automobiles.

Manufacturers will be interested in three projects on foot in Guatemala and Nicaragua, which plan highway construction to facilitate automobile traffic between the cities of these two countries. One automobile company has obtained concession to transport freight and passengers, without competition, between Leon and Matagalpa, Nicaragua, for the next 20 years.

Freight Rates to Far East Reduced

WASHINGTON, March 29—New and reduced rates on export traffic to China, Japan, Australia and the Philippine Islands, applying from Missouri River territory east through the Pacific Coast ports, have been issued by the United States Railroad Administration. Agricultural implements may now be shipped at \$1 per 100 lb. Passenger cars and parts go at the rate of \$3.75 and trucks and tractors at \$3 per 100 lb.

German Automobile Business Dull

WASHINGTON, April 1—The cessation of army contracts has unfavorably affected the German automobile industry, according to reports received by the Department of Commerce. No cancellations of army truck contracts have taken place yet, so that this work may go on for several months, but the passenger car business and commercial truck business prospects appear gloomy, due to the great numbers of vehicles built during the war suitable to commercial and other use. Neutral countries indicate but a limited demand for German vehicles. There is a scarcity of bearing metal and lubricants.

Agriculture Machine Purchaser from Sweden

WASHINGTON, March 28—A buyer of harvesting and agricultural machinery is expected to arrive in this country from Sweden in April, as the representative of a concern with connections in Scandinavia, Finland, Russia, the Baltic Provinces and Holland. This information came to the Department of Commerce from the Swedish Chamber of Commerce of the United States, which has its office at the Produce Exchange, New York.

Disposition of War Material Abroad

WASHINGTON, March 31—Considerable war material, including tractors and trailers, will be disposed of abroad by the American Expeditionary Forces. A list made public to-day by the War Department shows the stock abroad includes 84 20-ton tractors, of which 7 have been returned to this country; 820 10-ton tractors, of which 112 have been returned, and 605 gun trailers and gun carriages, of which 93 have been returned. The remainder will be disposed of by the A. E. F. Contract cancellations to date include \$240,000 worth of tanks, trucks and trailers, leaving \$24,585,000 worth of orders still to be completed. Motor vehicles, accessories valued at \$550, and oils, greases, etc., valued at \$1,107.94, were reported this week by the Director of Sales.

France Retards Ford Dealers

Government Sells 5000 in Devastated Regions—Importers Dissatisfied with Duty

PARIS, March 22—French dealers of Ford cars have a grievance against the government. There are at the present time about 5000 cars ready for assembly at the Ford factory at Bordeaux. As the French government no longer requires these for military purposes, it was requested that the Ford company should be allowed to repurchase them and sell them privately. The French government would not permit this, but insisted on the cars being completed and delivered according to contract.

As soon as ready these cars are sold by the government to the big railroad companies of France, or to persons in the devastated regions who have urgent need of transportation. The dealers claim that this is illegal competition. The government, instead of using these cars for its own purposes, is acting as a dealer, and selling the cars to private concerns, thus robbing the legitimate and established dealers of their profit.

French importers of American cars are preparing a statement to be submitted to C. C. Hanch, representative of the National Automobile Chamber of Commerce, setting forth the hardships of their case. At the present time it is forbidden to import cars to France, although there is an urgent need of transportation. It is claimed that this prohibition is necessary in order to enable the French factories to return to peace conditions. It is pointed out, however, that the prices of cars are exceedingly high, largely owing to prohibited imports, and that many manufacturers are now in a position to make deliveries.

Just before prohibition was adopted the French levied a 70 per cent import duty. This worked very unjustly against American importers, for the 70 per cent was calculated, not on the invoice price of the car, but on the price of the car delivered in the French ports, thus including the original price, ocean freight and insurance. In some cases cars which cost 6,250 francs had to pay an import duty of 10,000 francs.

European manufacturers do not suffer from this to the same extent, for freight charges from either England, Switzerland or Italy are very low compared with ocean freight from America. It is understood that these facts are being laid before Mr. Hanch in order that he may bring them to the attention of the proper authorities.

Efficiency of Benzol Fuel

LONDON, ENGLAND, Feb. 26—The efficiency of benzol as a motor car fuel was well shown recently with an American coupé, which had been averaging 15 miles to the gallon of gasoline and which averaged 21 miles per gallon on benzol under practically identical conditions.

The same car in the week's running around town is averaging between 19 and 20 miles per gallon on benzol. At present the price of benzol is artificially large and kept at the same level as gasoline, the only difference between the two being the 12 cents difference of the government license.

85,000,000 Bbl. of Gasoline Produced in 1918

WASHINGTON, March 29—Gasoline production in 1918 exceeded 85,000,000 bbl., an increase of 17,000,000 bbl. over 1917 production and 35,000,000 bbl. more than the production of 1916. The daily increase for 1918 was 47,000 bbl. above the 24-hour average of 1917. In 1916 there were 8,473,102 bbl. of gasoline sent abroad; in 1917 this amount increased to 9,901,877 bbl., while the 1918 exports reached a total of 13,312,508 bbl.

Gasoline Price War in South

NEW YORK, March 31—Certain parts of the South are at present in the throes of a gasoline war, which has brought the price of fuel down to 13 cents in Memphis. The battle was started when the Gulf Refining Co. cut its price 1 cent under Standard and other companies. Memphis has the lowest price, some other southern cities quoting as follows: Chattanooga, 16 cents; Knoxville, 18 cents, and New Orleans, 19 cents. It is anticipated that the war may reach to Baltimore, where the Gulf company is about to open headquarters. At present the cost is 22 cents.

Slow Methods Will Hamper Export Business

NEW YORK, April 1—A tire distributor in Manila complains about slow methods of some United States tire manufacturers, which is not going to accelerate export business. This distributor placed a number of orders with an American manufacturer. The orders included some items which had been increased in price, but the majority of items had not. Instead of filling the order with the exception of those items affected by a price increase the manufacturer held up the entire order. As it requires practically three months from the time of placing an order until the goods are received, the distributor was incensed at what he considered an unreasonable delay in the transaction.

Gear Manufacturers to Meet

CLEVELAND, April 2—The American Gear Manufacturers' Association will hold its annual convention here at the Hotel Statler, April 14, 15 and 16. The organization includes gear makers in the United States and Canada who are striving to develop means for standardizing their products. The coming convention will center its attention on this problem.

The following papers will be presented: "Gear Steels," by Dr. Parker, Carpenter Steel Co.; "Proper Sizes and Materials

for Gears;" "Worms and Worm Wheels," by a representative of the Timken-Detroit Axle Co.

The association officers are: President, F. W. Sinram, Van Dorn & Dutton Co., Cleveland; vice-president, H. E. Eberhardt, Newark Gear Cutting Machine Co., Newark, N. J.; secretary, Frank D. Hamlin, Earle Gear & Machine Co., Philadelphia; treasurer, Frank Horsburgh, Horsburgh & Scott Co., Cleveland.

Mexico Prohibits Oil Drilling

WASHINGTON, March 26—The Mexican Department of Industry has ordered foreign companies and individuals to refrain from drilling wells or any other wise developing the petroleum fields without permission of the Mexican government. The order reopens the many Mexican oil problems in which Great Britain, French and American companies are interested. The United States Department of State has begun a study of the order, and it is expected will soon take up the matter with Mexico.

High Freight Rates on Road Supplies Maintained

WASHINGTON, March 31—That the existing high freight rates for road construction materials will be maintained is evidenced in correspondence between the Highway Industries Association and the U. S. Railroad Administration. Protests were filed against the U. S. R. R. Administration plan, which will allow the reduction of freight rates on road building materials only if such are purchased by Federal, state or municipal agents, by the Highway Industries Association which pointed out that this would give very little relief. In reply the Director General of railroads stated that no reductions are now contemplated on the freight rates of materials for road building to be purchased by any other than the government, the states or municipalities.

Service Truck Putting Up Administration Building

WABASH, IND., March 29—An administration building to contain the offices of the company and to provide facilities for conventions and welfare work is being erected by the Service Motor Truck Co. The building, which will be three stories, 130 x 50 ft., fireproof and constructed of concrete and ivory finished brick, will cost about \$100,000. The company expects to occupy it in July.

Airplane Competition for France

Engines Will Be Officially Tested in 1920—Requirements and Specifications

PARIS, March 15—A big airplane and airplane engine competition will be organized by the French Government next year. It has been decided that there will be three types of engines:

- a—125 to 150 h.p.
- b—250 to 300 h.p.
- c—500 to 600 h.p.

Each engine will have to run 300 consecutive hours at 80 per cent of its maximum power.

The maximum weight for the complete engine with water, gasoline and oil for 5 hours running is 6.6 lb. Propeller speed is limited to 800 r.p.m. It has been decided that in order to allow present engines to compete, they can be used with geared-down propellers, in order to obtain the limited number of 800 r.p.m.

The airplane conditions are:

- a—Solidity with a coefficient of 6;
- b—Excess power; theoretical ceiling 5000 ft.;
- c—Minimum speed at 3280 ft.; 93 m.p.h.
- d—Landing ability; practical conditions corresponding to a weight of 38 kgs. per square metre maximum (this is based on the fact that the lower the wind for a given area, the easier it is for the plane to land);
- e—Security; Multi-engines. When three or four used, a single engine should be capable of maintaining the machine in the air.

Planes to Be Examined

Airplanes now under construction can be presented for examination as they are finished, but the final classification will not take place until 1920. In addition to this, there will be a big competition on a fixed date during the year 1920. It is stated that important orders will be placed for the successful machines, and all planes having obtained a satisfactory minimum number of points will receive an order sufficiently large to cover the cost of experiments.

U. S. Tractor Will Bring Out Uncle Sam

MENASHA, WIS., March 31—The U. S. Tractor & Machinery Co., organized with a capital stock of \$250,000, is equipping the Strange building at 100-110 Tayco Street for a machine shop and assembling plant, pending the construction of the first unit of its permanent plant. The company will produce the

Uncle Sam tractor, a 20-30 type designed by G. D. Harris, Chicago, who is the designer of the new company. H. C. Berry, chief engineer of the U. S. Tractor Co., Chicago, which is taken over by the new corporation, will hold the same position in the new organization.

Government Sells Non-Usable Vehicles

WASHINGTON, March 28—Request for bids on motor trucks and passenger cars made by the Zone Supplies and Storage Officers of Baltimore to the public this week has not been withdrawn because they did not state that the vehicles offered for sale were only scrap value and not usable. A proposal will be sent out by the War Department which will distinctly state that these vehicles are beyond repair and only good for scrap.

Export Licenses Valid Until Used

WASHINGTON, March 28—Export licenses which have been issued by the War Trade Board for Norway, Sweden, Denmark and European Holland, which by their terms are limited to a particular date, will be valid until used, notwithstanding that such licenses are stamped with the expiration date on them.

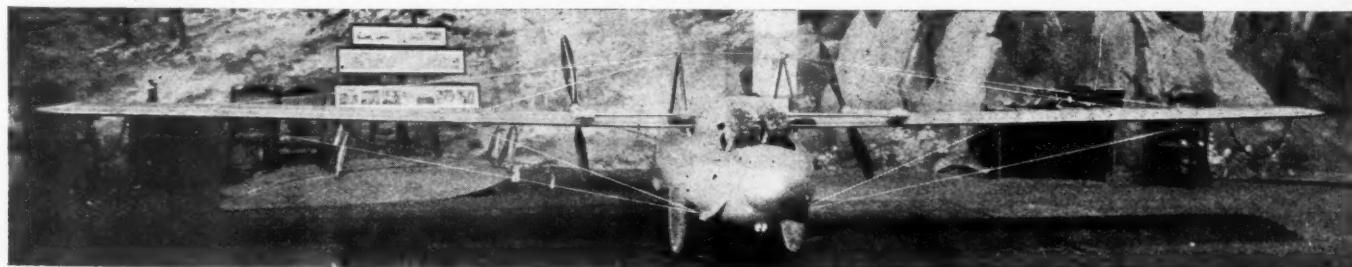
Swiss Aerial Passenger Service

WASHINGTON, March 29—An aerial passenger service between Zurich and St. Moritz, in Switzerland, is planned, a company being formed with capital stock of \$96,500. The Swiss legislature announces itself in favor of the scheme. A flight between the two cities can be made in an hour and the fare will be \$96.50 per person. These two towns are well known resorts frequented by tourists, and it is expected that they will patronize the air route.

Sell Condemned Army Trucks

WASHINGTON, March 31—Eighty trucks, touring cars and ambulances owned by the Army and which have been condemned as unserviceable will be sold to the highest bidders. These vehicles are at Canton, Md., and can be examined by application to Captain Wayman, 11th floor, Coco-Cola Building, Baltimore. Bids will be f.o.b. Canton, and bidders are expected to make full payment before the cars are delivered or shipped. Proposals should be accompanied by a certified check for 20 per cent of the amount of the maximum bid, and will be received up to April 4.

Included in the vehicles to be sold are: 2 Bourne, 2 Dodge touring, 1 Dodge



Gallaudet monoplane which is fitted with two motorcycle-type engines driving twin propellers

roadster, 1 Dodge patrol, 14 Ford touring cars and trucks, 2 G. M. C. ambulances, 1 Hupmobile touring, 1 International truck, 20 Kelly-Springfield trucks, 2 Liberty trucks, 1 Maxwell touring, 5 Overlands, 1 Peerless, 1 Reo, 1 Republic, 5 U. S. A. trucks, 5 White trucks, 1 Reo engine, 1 class B engine, 8 truck frames, 10 axles and housings, 1 class A transmission, 4 truck bodies, 2 trailers, 6 class B dashes and 2 truck seats.

Airplane Distribution of Parts for Service Trucks

WABASH, IND., March 29—Aerial distribution of repair parts to distributors and service stations for Service trucks has been instituted by the Service Motor Truck Co. It will be handled under contract with the Service Aviation Training & Transportation Co., a separate organization formed by stockholders of the Service Motor Truck Co. J. P. Porter, chief pilot, was formerly of the Royal Flying Corps and was one of the instructors at Love Field Aviation Camp, Texas. Assistant pilots are Harold C. Brooks and V. P. Hollingsworth. Oscar Bricker, formerly of Love Field, is in charge of the hangars and landing field. A 44-acre field has been prepared for landing. Curtiss JN-4 planes will be used.

Cleveland Co. Completes Experimental Cars

CLEVELAND, April 1—The Cleveland Automobile Co., recently organized by F. C. Chandler, J. V. Whitbeck and other Chandler officials, has completed its first experimental car. It is a 6-cylinder job with block-enclosed engine and 118 in. wheelbase. It is built to sell at approximately \$1,200. The body is of the straight line type, 5-passenger capacity, with cellular radiator. The company is making its own axles but is using Timkin ball bearings. The ignition system is Gray-Davis battery type. The bore and stroke of the engine is 3 x 4 1/4.

Ellis-Smith Making Complete Products

ELMIRA, N. Y., March 31—The Ellis-Smith Mfg. Co., Inc., is now making its products from raw materials in its own foundry.

Ford Tractor Plants Springing Up

Production at Detroit and Hamilton Under Way—Eight Small Plants Along Rouge River

DETROIT, March 26—Henry Ford's latest tractor projects, both here and in Hamilton, O., are well under way. The Detroit establishment is now hitting volume production and work is progressing on eight smaller plants along the River Rouge. In Hamilton, O., contracts have been let and work commenced on a \$1,000,000 tractor plant to be in operation in about a year.

The Hamilton plant will be operated by water power secured by damming the Miami River at that point. The units to go up first will be the power house, factory, dock and heating plant. Later warehouses and additional manufacturing units will be added. The capacity of the Hamilton plant will be 500 daily. The power plant will be 50 x 60 ft. The manufacturing plant, 100 x 700 ft., directly behind it, will be built of steel, concrete and brick. The dimensions of the loading dock are 30 x 400. The finished tractors will leave the plant under their own power and be driven to the loading dock and into the cars.

At Nankin, Mich., a few miles from Detroit, Ford is completing a small plant, consisting of a dam, power-house and factory. It will be in operation soon. At that time some parts departments from the present Fordson plant at Dearborn will be moved into the small establishment, and certain other parts will be made there.

A similar factory, only larger, is about to be built at Plymouth. Plans for the Plymouth plant are now being drafted. Work on a dam at that point is under way, and building operations will start soon. Each of these little factories will employ from 25 to 75 men.

Army Trucks for Hospital Use

WASHINGTON, March 31—The 1000 motor trucks which were recently turned over by the War Department, as an-

nounced in a past issue of AUTOMOTIVE INDUSTRIES, will be used for the transport of soldiers, sailors and marines between government hospitals. These trucks were transferred without charge to the Secretary of the Treasury, who directs the Public Health Service under Public Act No. 326, which authorizes such transfers and directs the Secretary of War to supply as many motor vehicles not required by the War Department as may be required by the Health Service.

Packard Now in Production

DETROIT, April 1—The Packard Motor Car Co. has completed its first passenger car since the war and expects to be in production by the first week of April, although earlier plans did not call for production until May. The last war truck has been completed and the government adjustment of canceled contracts is progressing rapidly.

Martin Co. Buys

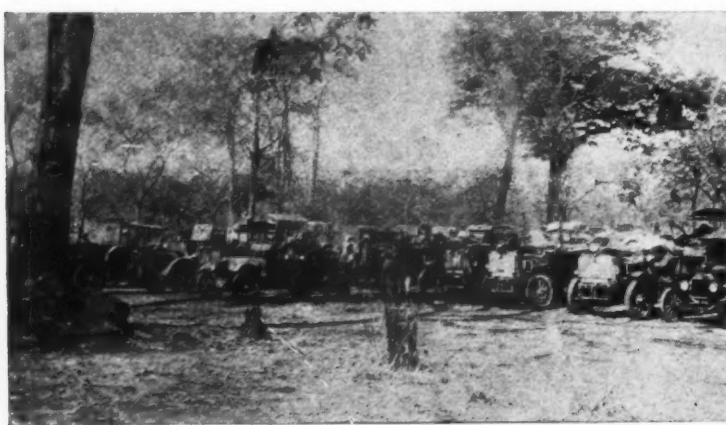
LANCASTER, OHIO, March 31—The Martin Mfg. Co. has purchased a 3-story building formerly occupied by the Wilson Mfg. Co. for \$39,000.

Ford Considers D. C. Site

WASHINGTON, March 29—Henry Ford & Son will give "due consideration" to Washington when they decide to build another factory, according to a letter received here to-day by the Chamber of Commerce from E. G. Liebold, secretary to Henry Ford. The letter was in response to a request by the Washington Chamber of Commerce urging Mr. Ford to locate his next plant here.

New Advance-Rumely Four-Wheeled Tractor

LAPORTE, IND., March 31—The Advance-Rumely Thresher Co. has developed a new small four-wheeled tractor which is quite similar to its older models, and which is designed to pull three 14-in. mold board plows or four disk plows. It is rated 12-20 hp. and follows standard Oil-Pull design and construction throughout. It has a slow-speed, two-cylinder, horizontal, heavy-duty engine, equipped



Left—Motor convoy in camp in Bush country, late German East Africa. Right—A frequent occurrence to motor transport in the swamp districts of German East Africa during the late campaign



with a Secor-Higgins carburetor burning kerosene, and has the usual oil cooling system and fanless radiator. All transmission gears are cut from forged steel blanks, and are thoroughly protected from dust and run in oil. Transmission shafts and axle are mounted in Hyatt roller bearings. The gearset provides forward speeds of 2.1 and 3.26 m.p.h. and reverse.

Maxwell-Chalmers Rumored Moving

DETROIT, March 31—Maxwell-Chalmers Motor Car Co. officials will neither confirm nor deny the story coming from Dayton that the company proposes to move its plant to this city. Dayton newspapers, however, declare such a deal is contemplated, and that the removal will be made within the next five weeks. The plants of the company in Dayton employ about 2500 men. It is also rumored that the Maxwell Motor Corp. plant at New Castle, Ind., also will be moved here. The New Castle plant employs 2500 men.

Pontiac Factory Destroyed by Fire

PONTIAC, MICH., March 28—The Hess Pontiac Spring & Axle Co., a unit of the Standard Parts Co., Cleveland, was destroyed by fire Monday night. The loss is \$150,000, of which \$90,000 is covered by insurance. The forge plant burned down. A new forging department will be built immediately. Approximately 150 men are out of work. The fire started from the explosion of an oil burner.

Aluminum Co. to Build Warehouse

DETROIT, April 1—The Aluminum Co. of America, which leases a warehouse here, is about to build one of its own. A 5-acre site in the northeastern factory district has been purchased and building will start soon.

Allied Industries Takes Over Star P. & V.

NEW YORK, March 31—The Allied Industries Corp., which is a manufacturers' representative, has taken over the business and agency lines formerly controlled by the Star P. & V. Corp. These include Gary truck, Fruehauf trailers, Esta water auxiliator and Federal tires.

Kelly-Springfield Doubles Stock

NEW YORK, April 2—Stockholders of the Kelly-Springfield Tire Co. have approved the proposal of the directors and authorized the increase of the common stock from \$5,029,000 to \$10,000,000. The increase is for the purpose of distributing common stock dividends at the rate of 3 per cent quarterly, beginning in May.

Edison Lowers Price of Batteries

ORANGE, N. J., April 2—The Edison Storage Battery Co. has reduced the price of types A, B and C Edison Cells about 16 per cent.

Merger Rumors Set Detroit Talking

Ford, General Motors, Maxwell-Chalmers and Standard Parts All Involved

DETROIT, March 28—This city is seething with merger rumors affecting the Ford Motor Co., General Motors, Standard Parts Co., and Maxwell-Chalmers Motor Car Co. These rumors are directly due to General Motors expansion projects. While 80 per cent must be discounted as street talk, there is sufficient evidence to convince automotive circles that transactions of magnitude are pending. In every instance, however, officials of the companies are busy issuing denials.

Rumor declares that General Motors is trying to gobble up the Ford interests in the Ford Motor Co. From a semi-authentic source it is learned that the Du Pont-Durant interests have made the Fords a cash offer for their holdings in this company. From another equally authentic source comes the declaration that Henry and Edsel Ford have no desire to dispose of their stock, and that the first announcement of their proposed withdrawal from the Ford company was a mistake.

A typical illustration of the type of rumors going around tells of a General Motors project to purchase the Ford stock in the Ford Motor Co. for \$187,000,000 and to discontinue the manufacture of Ford cars entirely. In such event the plant would be used for the manufacture of Cadillac cars.

While no statement has been issued, it is certain, however, that General Motors is planning large expansion projects involving leading automotive concerns. It is a known fact that a consolidation of the Maxwell-Chalmers companies is being worked out with General Motors' financial aid. Details of this proposed merger have been published in New York and are generally known among Detroit brokers. For a financial consideration General Motors is to get possession of the common stock of Maxwell-Chalmers, and, while it might not take over the active management, the Maxwell-Chalmers organization would virtually become a General Motors unit.

Merger plans call for the organization of a new company to take over on an exchange of security basis, yet to be worked out, assets of the present Maxwell company. An effort is to be made to cancel the lease of the Chalmers, under which Maxwell is operating the former's plants, and take the Chalmers directly into the new Maxwell corporation. Some new cash capital would be supplied by General Motors. The proposed change in management is to be deferred until the end of the current fiscal year, July 31.

General Motors officials and officers of the Standard Parts Co. deny the report that the Durant interests are negotiating for the control of the Cleveland company. Absorption of Standard Parts,

however, would give General Motors practically everything which goes into the manufacture of an automobile and place it in a great strategic position in the manufacturing field. United Motors Corp., which is a General Motors concern, is supplying ball and roller bearings, gears and transmissions, ignition systems, passenger car axles and engines. Control of Standard Parts would add truck axles, springs, rims, bearings, etc.

Changes on Staff of Motor Life

NEW YORK, March 31—C. B. Ames, business manager; C. G. Sinsabaugh, editor; A. B. Hunt, southern advertising manager, and W. W. Sheppard, western advertising manager, of *Motor*, have resigned their connection with that publication to become associated in similar capacities with *Motor Life*.

Sinsabaugh was with *Motor* for four years, previous to which he had been editor of *Motor Age*. Hunt, Ames and Sheppard were identified with *Motor* for approximately 12 years. A. J. Stocker, for many years with *Automobile Blue Books*, becomes middle western advertising manager of *Motor Life*. All five of these men will be engaged to some extent in work on the *Automobile Blue Books*, as well. Monte W. Sohn, former editor of *Motor Life*, leaves that post to assume the post of Director of Research and Publicity for *Motor Life*, *Automobile Blue Books* and *Automobile Trade Directory*.

Pilot McClelland in America

NEW YORK CITY, April 2—Pilot H. McClelland of the R. A. F., who gained the distinction of having piloted the Handley-Paige bombing plane from England to Salonica in July, 1917, arrived in America last week for a 2-months' visit. Pilot McClelland was a member of the independent bombing forces of Great Britain whose special work was to bomb industrial centers of the Rhine Valley.

Fair Association Buys Tractors

CHATTANOOGA, TENN., March 28—To help the tractor manufacturer get his product better known in the South and to get Southern farmers to see the opportunities and greater yields from power farming are the two reasons which have caused the Chattanooga Interstate Fair Association to buy two Case tractors for demonstration purposes. These tractors, a 10-18 and 10-23, will be delivered this week and immediately put to work on farms in the vicinity of Chattanooga. Hamilton County, in which this city is situated, has at present about twelve or thirteen tractors scattered through it. The plan of the association is to make the tractors self-supporting, so that when they are finally worn out there will be money to buy new ones.

The outline of the working schedule of these tractors is as follows: Two men have been hired as operators, and receive besides their daily wages a certain sum for every acre plowed, disked or harrowed. The machines will operate in different parts of the county. Each man

will carry his own fuel and supplies, as many of the farms in this section of the country do not carry these.

The men will pick their customers, who are to pay not more than \$2.50 for haying the land turned, 75 cents for having it disked and a proportional sum for drag-harrowing. A minimum of 5 acres is to be worked, but many of the farmers working small tracts of land can club and thus get the minimum figure. It is very likely that tractors will be sold here in much the same way; that is, several farmers whose lands adjoin may purchase a tractor jointly, because singly their farms are too small to warrant buying a tractor.

The farmer whose land is being worked will board the tractor man. Two sizes of machines were chosen, so farmers can study the performances of both and pick ones suitable for their needs.

Stanley Develops Railway Car

BOSTON, April 2—The Gray & Davis Co. is now building units for the newly formed Unit Railway Car Co., Newton, Mass., which is building the Stanley railway car for use on lines of any road. This car was designed by the Stanleys, and when the motor car plant was taken over by the new company they retained the patents for the vehicle. The car is operated by a steam engine and uses kerosene or fuel oil in the burner. The engine is geared direct to the driving axle by a spur gear, and both units run in an oil bath in an oil-tight case.

Will Support Federal Highway Bill

WASHINGTON, March 31—That Senator Charles E. Townsend, who will probably be chairman of the Committee on Post Offices and Post Roads in the Senate, will support the highway commission bill was evidenced by a letter sent to the Rotary Club of Kalamazoo by Senator Townsend, in which he stated: "You may be certain that if I shall become chairman of the Committee on Post Offices and Post Roads in the Senate, I shall devote most conscientious attention to this great subject (the Federal highway commission bill), which is properly within that committee's jurisdiction."

Bour-Davis Car Made by Louisiana Car Co.

SHREVEPORT, LA., April 2—The Louisiana Motor Car Co. has taken over the production of the Bour-Davis car and is now putting through a run of 33 jobs, and will bring out also a 2-2½-ton truck. One hundred of these trucks are now going through. The company has been in existence for a year and in actual production for about 4 months, and has produced to date 24 cars and 2 trucks. W. F. French is general manager of the company, which is capitalized at \$1,000,000 and headed by T. H. McGregor. Other officers are E. C. Rhodes, vice-president; factory manager and engineer, William Ross, and chief designer, A. L. Vargha.

Government Buys 14 Aviation Fields

Will Retain These and Six Balloon Stations—Will Release 11 Other Fields

WASHINGTON, March 31—The Government has purchased fourteen aviation fields and will retain six balloon and aviation fields that are already Government owned. Eleven aviation fields used during the war have been released. Following the announcement of this fact in a recent issue of AUTOMOTIVE INDUSTRIES, it can now be stated that the following fields are the ones to be purchased and released. Those being purchased are:

March field, Riverside, Cal.
Mather field, Sacramento, Cal.
Carlstrom field, Arcadia, Fla.
Dorr field, Arcadia, Fla.
Ellington field, Houston, Tex.
Kelly field No. 2, San Antonio, Tex.
Park field, Millington, Tenn.
Souther field, Americus, Ga.
Selfridge field, Mount Clemens, Mich.
Chanute field, Rantoul, Ill.
Scott field, Belleville, Ill.
Balloon School, Arcadia, Cal.
Brooks field, San Antonio, Tex.
Engine and repair depot, Montgomery, Ala.

Under the same order the following fields will be released June 30, 1919:

Wilbur Wright field, Dayton, Ohio.
Taylor field, Montgomery, Ala.
Payne field, West Point, Miss.
Elberts field, Lonoke, Ark.
Gerstner field, Lake Charles, La.
Call field, Wichita Falls, Tex.
Taliaferro field, Hicks, Tex.
Carruthers field, Benbrook, Tex.
Barron field, Everman, Tex.
Love field, Dallas, Tex.
Rich field, Waco, Tex.

Further orders will define the policy regarding Chapman Field, Miami, Fla., and Hazelhurst and Mitchell fields at Mineola, Long Island.

It is understood that the following fields owned by the Government will be retained:

Army Balloon School, Fort Omaha, Neb.
Army Balloon School, Lee Hall, Va.
Kelly field No. 1, San Antonio, Tex.
Post field, Fort Sill, Okla.
Rockwell field, San Diego, Cal.
Langley field, Hampton, Va.

According to the Assistant Secretary of War, the Army Air Service will abandon Camp John Wise, San Antonio, Tex., and McCook Field, Dayton, Ohio.

The status of Bolling Field, Anacostia, D. C., has not been definitely decided.

Tarrytown Addition for Chevrolet

NEW YORK, April 2—The General Motors Corp., Chevrolet Division, has awarded the contract for the erection of a 3-story reinforced concrete enameling and assembling plant on its Tarrytown, N. Y., property. The building will be 220 x 80.

England Fears Foreign Competition

(Continued from page 738)

tion to question the legality of the Board of Trade's action in continuing to exclude goods now that the war is practically over, without the direct sanction of the

legislature. It is, however, expected that a statement of policy on this matter will be made within the next fortnight. Up to the present it seems as if the State Department concerned is merely acting as an agent of manufacturers whose plea that their action is to protect labor from being unemployed, deceives no one who is acquainted with the past views of many of these persons, and who now fails to see any corresponding effort of theirs to resume their normal time productions. There seems to be some special favor being shown to the Ford interests in the matter, for it is admitted that quite a large number of parts have been permitted to be imported for that car—and the defense offered is the plea that two-thirds of the materials required had been made up here. Naturally many people in the trade are asking why it is not possible for them to get imported spares for cars of other makes and why all this special attention to Ford interests.

I now hear that the Morris Co. have fixed up a contract for engines with the Hotchkiss Co. at Coventry, but as this company is unknown here as builders of small car engines, some doubt exists as to the outcome of this deal. Writing of specialist engines and engine builders reminds me that a big fillip is being given to this side of the British industry, notably by the Tylor Co. of London and the Dorman Co. at Stafford, both these companies being out for mass production.

The Tylor company has a new large works still unfurnished where the engine for the Angus Sanderson car is being built. The Dorman Co. hitherto have been mostly associated with engines for trucks, but are now going to cater for the car and light car trades. They have one size of engine about being started on for a mass output of 12,000 sets to be retailed at \$225 without magneto and carburetor. The pre-war corresponding figure for this engine would have been about \$150.

This company also is about launching a scheme for getting private car owners interested in Dorman engines. It is proposed to list this special engine to garage men and repairers at a discount, and with special inducements to interest them in re-engining customers' cars. Blue prints and all particulars and brackets and lugs for attaching the engine will be offered ready for standard makes of cars, the necessary fittings being listed at practically cost price.

Olympia Show Nov. 7-15

LONDON, ENGLAND, March 20—The Society of Motor Manufacturers and Traders have definitely fixed the dates for the Olympia Motor Car Exhibition. These are Nov. 7-15 inclusive.

Briggs Leaves Wheeler-Schebler

NEW YORK CITY, April 2—George T. Briggs, for years sales manager of the Wheeler-Schebler Carburetor Co., Indianapolis, has resigned and associated himself with the Sinclair Refining Co., Chicago.

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:

Muriatic, lb. 02 -.03
Phosphoric (85%).. 35 -.39
Sulphuric (60%), lb. .008

Aluminum:

Ingots, lb. 31
Sheets (18 gage or
more), lb. 42
Antimony, lb.061/2-.067/2

Burlap:

8 oz., yd.061/2
10 1/2 oz., yd.081/2

Copper:

Elec., lb.151/2
Lake, lb.151/2

Fabric, Tire (17 1/2 oz.):

Sea Is., combed, sq. yd. 1.50
Egypt, combed, sq. yd. 1.25
Egypt, carded, sq. yd. 1.15
Peelers, combed, sq. yd. 1.10
Peelers, carded, sq. yd. 1.00

Fibre (% in. sheet
base), lb. 50

Graphite:

Ceylon, lb.90 -.22
Madagascar, lb.10 -.15
Mexico, lb.031/2

Lard:

Prime City, gal.... 2.40
Ex. No. 1, gal.... 1.10 -.15
Linseed, gal. 1.45 -.148
Petroleum (crude):
Kansas, bbl. 2.25
Pennsylvania, bbl. 4.00
Menhaden (dark),
gal.95

Lead, lb.05 -.051/2

Leather:

Hides, lb.24 -.391/2

Nickel, lb.40

Oil:

Gasoline:
Auto, gal.241/2
68 to 70 gal.301/2

Rubber:

Plantation:
First latex pale
crepe, lb.501/2
Brown crepe, thin,
clear, lb.45
Smoked, ribbed
Sheets, lb.491/2

Para:

Up River, fine, lb.56
Up River, coarse,
lb.34
Island, fine, lb.471/2

Shellac (orange), lb.60 -.64

Speicer, lb.061/2-.061/2

Steel:

Angle beams and
channels, lb.03
Automobile sheet
(see sp. table).
Cold rolled, lb.0625
Hot rolled, lb.039
Tin71 -.72
Tungsten, lb. 1.50 -.21.10
Waste (cotton), lb.121/2-.17

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock.....	\$5.95	\$5.85
Automobile body stock deep stamping.....	6.20	6.10
Automobile body stock, extra deep stampin.....	6.45	6.35

Hood, flat, fender, door and apron, or
splash guard stock..... 6.05 5.95
Crown fender, cowl and radiator cas-
ing, extra deep stamping..... 6.55 6.45
Crown fender, cowl and radiator cas-
ing, deep stamping..... 6.30 6.20

Automobile Sheet Extras for Extreme widths:

Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.

Blank Sheet Extras to Apply to Narrow Widths:

Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.
Resquaring, 5 per cent of gage price after quality, finish and
size extras have been added.
Seconds 10 per cent less than the invoice Pittsburgh price for
corresponding primes.

Automobile Makers Buy British
National Factory

THE first of fourteen large manufacturing plants erected
by the British Government during the war has been dis-
posed of by the Disposal Board, Land and Buildings Section.
This is the National Aircraft Engine factory at Edmonton,
which has been purchased by Straker-Squire, Ltd., for £140,-
000. It is stated that the original cost of construction was
£133,000.

The factory is a new one, constructed within the last two
years and comprises a splendid range of buildings of brick
and glass, standing on a site of 14 acres. The works adjoin
the Edmonton passenger station, and are well equipped with
railway sidings.

The purchasers propose to transfer the whole of their
manufacturing activities to Edmonton. Their program is to
concentrate upon two standard models, a six-cylinder type of
fast pleasure car and a four-cylinder commercial chassis suitable
for transport work and motor omnibuses. The cars will
be British-built throughout, and will be fitted with British
magneton. Almost all the engineering work and the whole of
the body work will be completed on the premises. The entire
factory will be organized on the lines of quantity production
from standard jigs, and it is anticipated that 5000 work-
people will be continuously employed. It is planned to pro-
duce 2000 complete vehicles the first year.

Automotive Securities on the Chicago Exchange at Close March 29

	Net Bid Asked Ch'ge		Net Bid Asked Ch'ge		Net Bid Asked Ch'ge
Auto Body Company.....	8 9 1/2 ..		Motor Products Corp.....	35 ..	
Briscoe Motor Car com....	13 ..		Nash Motors Co. com....	230 ..	
Briscoe Motor Car pfd....	50 65 ..		Nash Motors Co. pfd....	95 100 ..	
*Chandler Motor Car....	124 7/8 126 7/8	—1/2	National Motor Co....	15 20 ..	
Chevrolet Motor Car....	189 191 ..		Packard Motor Car com....	115 119 +1	
Cole Motor Car Co....	93 105 ..		Packard Motor Car pfd....	99 101 -1	
Continental Motors com....	75% 8 1/2	—1/2	Paige-Detroit Motor com....	28 29 -1/2	
Continental Motors pfd....	98 101 +1		Paige-Detroit Motor pfd....	8 3/4 9 1/2 ..	
Edmunds & Jones com....	15 20 ..		Peerless Motor Truck....	22 24 ..	
Edmunds & Jones pfd....	75 90 ..		Pierce-Arrow M. Car com....	45 1/4 46 1/4 +1	
Electric Storage Bat....	69 71 +5		Pierce-Arrow M. Car pfd....	102 104 -2 1/2	
Federal Motor Truck....	34 36 ..		Premier Motor Corp. com....	5 ..	
Fisher Body Co. com....	55 58 +7		Premier Motor Corp. pfd....	75 ..	
Fisher Body Co. pfd....	95 98 ..		Prudden Wheel Co....	18 19 ..	
Ford Motor of Canada....	285 295 +15		Reo Motor Car Co....	23 1/2 24 1/4 -1/4	
General Motors com....	170 1/2 171 1/2	+8 1/4	Republic M. Truck com....	36 37 ..	
General Motors pfd....	89 1/2 91 1/2	+1/2	Premier Motor Corp. pfd....	75 ..	
Hupp Motor Car com....	8 3/8 8 7/8	+1/2	Saxon Motor Car com....	6 1/2 8 1/2 ..	
Hupp Motor Car pfd....	95 100 ..		Scripps-Booth Corp....	21 25 ..	
Kelsey Wheel Co. com....	37 39 -2		*Stewart Warner S. Corp....	89 1/4 91 1/4 -1 1/2	
Kelsey Wheel Co. pfd....	94 96 -1/2		Stromberg Carburetor Co.	38 40 +1	
Manhattan Electric S. com ..	48 ..		Studebaker Corp. com....	63 3/4 64 1/4 +1 1/2	
Maxwell Motor com....	38 7/8 39 1/2	+3 1/4	Studebaker Corp. pfd....	94 97 ..	
Maxwell Motor 1st pfd....	67 1/2 68 1/2	+4 1/2	*Stutz Motor Car Co....	50 1/2 51 1/2 -1/2	
Maxwell Motor 2d pfd....	31 1/2 32 1/2	+3 1/2	United Motors Corp....	43 1/2 45 1/2 +1/2	
*McCord Mfg. com....	33 ..		*White Motor Co....	52 1/2 53 1/2 +1/2	
*McCord Mfg. pfd....	91 93 1/2 +1		*Willys-Overland com....	29 1/2 30 1/2 +1/2	
Mitchell Motor Co....	27 31 ..		Willys-Overland pfd....	92 93 ..	

*Ex dividend.

	Net Bid Asked Ch'ge		Net Bid Asked Ch'ge	
RUBBER STOCKS				
Ajax Rubber Co.....	71 1/2 72 1/2 -2 1/2			
*Firestone T. & R. com....	147 149 -2			
Firestone T. & R. pfd....	99 1/2 101 1/2 ..			
Fisk Rubber Co. com....	103 105 ..			
Fisk Rubber 1st pfd....	100 105 ..			
Fisk Rubber 2d pfd....	101 105 ..			
Fisk Rub. 1st pfd conv....	99 101 ..			
Goodrich, B. F., com....	66 1/2 67 1/2 -2 1/4			
Goodrich, B. F., pfd....	106 1/2 107 1/2 +1/2			
Goodyear T. & R. com....	270 273 ..			
*Goodyear T. & R. 1st pfd.	106 107 +1/2			
Kelly-Springfield com....	119 1/2 120 1/2 ..			
Kelly-Springfield pfd....	95 97 ..			
Lee Tire & Rubber Co....	24 25 ..			
Marathon Tire & Rubber	55 75 ..			
Miller Rubber Co. com....	175 178 ..			
Miller Rubber Co. pfd....	101 1/2 103 ..			
Rubber Products Co....	133 135 ..			
Portage Rubber Co. com....	163 165 ..			
Swinehart T. & R. Co....	80 85 ..			
U. S. Rubber Co. com....	83 1/4 84 1/4 +1/2			
*U. S. Rubber Co. pfd....	110 1/2 111 1/2 -1/2			

Hanch Visiting Foreign Factories

PARIS, March 14—C. C. Hanch, official delegate of the National Automobile Chamber of Commerce, left Paris to-day for Lyons and Turin. He attended the International Meeting of Allied Automobile Manufacturers called together by the French makers, and at which the formation of a permanent bureau was decided on. Mr. Hanch will spend 2 days at the Lyons fair and from there will proceed to Turin and Milan, to visit such factories as Fiat, Isotto-Fraschini, Lancia, Spa, Bianchi and Itala. On returning from Italy, he will spend a few days in the Paris district before leaving for England, where he expects to remain about a month, and will then sail for America.

Released Officers with Standard Parts

CLEVELAND, March 28—Several officers who left their positions with the Standard Parts Co. to go into government service have returned to civilian life and their pre-war work. Other officers identified with the engineering division of the Motor Transport Co. have also been added to the staff.

Capt. E. R. Finkenstaedt, formerly active in the production of the Liberty truck for the government at Washington, has resumed his duties as assistant to President Christian Gir. Major Lewis P. Kalb, until recently in charge of designing, testing and specification work in the engineering division of the Motor Transport Corps, has joined the engineering staff of the company as assistant director of engineering, and Capt. A. L. Watts, in charge of the specification and record section of the engineering division of the Motor Transport Corps, has also joined the engineering staff. Both Lieut. Rex Gosling, who before entering service was purchasing agent of the Standard Welding division, and Lieut. Ray Jones, who gave up his position as production manager of the Perfection Spring division to enlist in the navy, have returned to their respective plants.

V. K. McBride, formerly assistant sales manager of the Federal Motor Truck Co., has been appointed to a similar position with the Premier Motor Corp., Indianapolis.

Fred D. Rice, who has recently been released from service in the navy, is now representing the Hess Steel Corp., Baltimore, in western New York and western Pennsylvania.

Frank Dawson, who has been identified with the truck industry for the past 14 years, has resigned as designing engineer and production manager of the Master Truck Co., Chicago, to become general manager in charge of production for the Gary Motor Truck Co., Gary, Ind.

Herman A. Holz, metallurgical engineer and manufacturer of metallurgical and magnetic testing apparatus, has moved his office from 1 Madison Avenue to 17 Madison Avenue, New York City, where he is occupying the third floor.

Men of the Industry

Changes in Personnel and Position

British Trade Expert Will Try to Recapture Colonial Trade

LONDON, ENGLAND, March 17—The Association of British Motor & Allied Manufacturers, Ltd., has appointed Major R. E. Goddard as its overseas commissioner. He will make a tour of investigation of the markets of Australasia, India and the East and will include Ceylon, the Dutch East Indies, Australia, New Zealand, Japan, China, Malaya, Burma and India, in the order named. The whole tour will occupy about a year. It is possible that operations will be extended to other territories if this first year's tour is as satisfactory as anticipated. In this matter the association is acting in conjunction with the Overseas Trade Department of the British government. The government is assisting in every way, partly as regards finance and partly as regards official introductions and shipping arrangements.

Though Major Goddard has good credentials for his task, it is not clear how he is to compass so wide and distant a field of trade territory in a year. This is especially true because he is faced with the task of trying to dislodge American hold of the Australian and New Zealand markets, which were lost through lack of competent control and progressive ideals.

Ben Drewes, general superintendent of the foundry department of the Avery Co.'s motor works at Milwaukee, resigned April 1 to accept the position of foundry superintendent of the Kissel Motor Car Co., Hartford, Wis. He is succeeded by G. H. Joner, who has been assistant superintendent. Mr. Drewes went to the Avery motor works from the Kissel company about a year ago.

F. H. Berger, Detroit, former chief engineer of the Oakland Motor Car Co. and of the Abbott Co., is reported to be designing a new car. He has opened an office in the Hodges building.

C. R. Bulley has been appointed sales metallurgist to the Hess Steel Corp., Baltimore. During the war he was in charge of the design, building and operation of the heat-treating department of the Symington-Anderson Co., Ordnance, Rochester, manufacturers of 75 mm. field shells for the government. Prior to this he had several years' experience in the metallurgical department of the Halcob, Midvale and Carpenter steel companies.

Edward S. Babcox has been appointed sales manager of the Rubber Products Co., Barberton, O.

Ford Mechanical Engineer Rumored Out

DETROIT, March 31—It is rumored here to-day that Charles Mongana, Jr., chief mechanical engineer of the Ford Motor Co., has resigned and is out. This cannot be confirmed at the Ford plant. It is also repeatedly heard on all sides that F. L. Klingensmith, vice-president of the company, will retire immediately upon his return from his vacation.

Jack Neely, formerly with the sales department of the Roamer distributing agency at Kansas City, has been made assistant sales manager of the Barley Motor Car Co., Kalamazoo, makers of Roamer cars.

Edward T. Walling, associated with the Spranger Wire Wheel Co. for five years as assistant general manager, has resigned.

C. L. Thurston, export manager, has been placed in charge of the export offices of the Briscoe Motor Corp., Jackson, Mich., which have been opened at 1834 Broadway, New York City.

H. B. Niblette has been appointed supervisor of the tire sales division of the Thermoid Rubber Co., Trenton.

Allan S. Place, formerly with the Chevrolet Motor Co., Flint, has become superintendent of the Duplex Truck Co., Lansing.

W. D. Langdon, purchaser of metals for the Willys-Overland Co., Toledo, has been made assistant general purchasing agent of the company.

H. A. Reed, vice-president of Reed, Tilley & Co., Inc., exporters of automotive apparatus, has just returned from a business trip through Cuba.

Robert Evans, formerly service manager of the Page-Detroit Motor Car Co., is the new service director of the Landman-Griffith Co., Toledo.

John Gilson, Sr., Port Washington, Wis., founder of the Gilson Mfg. Co., manufacturer of gasoline engines, garden tractors, etc., died March 24 at the age of 69 years.

John Millen, of 366 Wood Avenue, Westmount, president of John Millen & Son, Ltd., 323 St. James Street, Montreal, Canada, died on Tuesday, March 25, in his 76th year.

Warner Gear Secretary-Treasurer Dies

CHICAGO, March 31—John Edgar Johnson, age 45, secretary-treasurer of the Warner Gear Co., Muncie, Ind., died suddenly Sunday morning after one week's illness. Johnson was born in Ashtabula, O., but was a resident of Muncie since the age of seven. He was also associated with the Morrison-Johnson Insurance Co. and a director of the Muncie Savings & Loan Co.

Additional Buildings for Stephens

FREERePORT, ILL., March 31—Approximately \$125,000 is being expended by the Stephens Motor Car Co. on additional buildings, new machinery and equipment. Both of the main units are now in operation. Until March 1 only the Chicago Street plant, employing 227 men, was active, the old Freeport carriage plant, known as Plant No. 2, having been idle since the opening of the war, when lack of materials forced a temporary suspension. The latter unit will employ 300 men. The schedule calls for an output this year of 5000 cars. The No. 1 plant has been specializing in bodies for commercial trucks, and its business for 1918 aggregated \$1,000,000.

Continental Motors Handled by

Beckley Ralston

CHICAGO, March 29—Retail sales of single engines and spare parts for Continental motors for replacement in cars and trucks will be handled in this territory by the Beckley Ralston Co., accessory dealers and jobbers. The company expects to establish several repair depots in the city.

Duplex Truck Co.'s Production Increased 25 Per cent

LANSING, March 29—The Duplex Truck Co. has increased its production 25 per cent in the last three months, having completed its return from war to peace work without difficulty. The company now has 70 active distributing agencies throughout the country.

Olympian Increases 100 Per Cent in Production

PONTIAC, MICH., March 31—The Olympian Motor Car Co. has increased production 100 per cent in the last 30 days. The company is now running 10 and 12 cars daily. The last of the depth-bombs, which it was making for the navy, was completed Saturday.

American Bosch Co. Holds Sales Convention

NEW YORK, March 31—The American Bosch Magneto Co. closed its first sales convention last Thursday. The morning of the first day was taken up with an automobile trip around Springfield. Inspection of the works was held in the afternoon and business sessions in the evening. Wednesday and Thursday were given over to a discussion of trade matters and a review of new products. On Wednesday evening 100 executives and department heads sat down to a banquet at the Nayassett Club.

Giant Trucks in New Hands

CLEVELAND, March 31—The motor truck division of the Chicago Pneumatic Tool Co., making Giant trucks, was purchased Saturday by C. A. Finnegan, of Buffalo, N. Y., owner of the Buffalo *Commercial*, and A. Webber, who is interested with Mr. Finnegan in various enterprises. The business will be carried on with all branches and employees as be-

Current News of Factories**Notes of New Plants—
Old Ones Enlarged**

fore. H. B. Young will be associated with the new company in an executive capacity and will be in Chicago.

Bohnst & Co. to Enter Body Field

LANSING, MICH., March 28—John Bohnst & Co. have increased their capitalization from \$10,000 to \$75,000 and will enter the commercial body field. The company will be in production within 60 days. The present factory building, which has 60,000 sq. ft. of floor space, will be altered to accommodate the new department. W. G. Suprenant, Philadelphia, has been placed in charge of the body work.

Walker-Weiss Now Flint Axle

FLINT, MICH., March 31—The Flint Motor Axle Co. is the new name taken by the Walker-Weiss Axle Co. The capital stock and the policy of the company will remain unchanged, and with the exception of W. T. Walker, the same men are in control of its affairs. Mr. Walker disposed of his interest last April, and the remaining members of the concern took over his stock. The company has been making axles for the Chevrolet Motor Co. of New York, the Dort Motor Car Co. of this city, as well as for other outside concerns.

New Ford a Couple of Years Off

DETROIT, March 26—In a letter signed by Edsel B. Ford, sent to all dealers throughout the country, the Ford Motor Co. says that rumors about the new Ford are greatly exaggerated.

"In the first place," the letter states, "a large majority of the rumors afloat are distorted. A new car may be manufactured, but when we are not in a position to say, except that we know a new car could not possibly be designed, tested out, manufactured and marketed in quantity under two or three years."

Superb to Manufacture Trailers

MONTICELLO, IND., March 31—In addition to manufacturing parts and accessories the Superb Mfg. Co. will bring out a line of light and heavy trailers within the next 60 days. In order to have sufficient production facilities it is adding 20,000 sq. ft. of floor space to its present plant.

Traffic Truck in New Quarters

ST. LOUIS, March 31—The Traffic Motor Truck Corp. is moving from its original factory at 3810 Laclede Avenue to 8000 North Broadway, where it will have more than 100,000 ft. of factory space.

No Plans for Future of Inter-State

DETROIT, March 26—The General Motors Corp. has not stated to what use it will put the plant of the Inter-State Automobile Co., Muncie, Ind., purchased last week. The sale included the plant and 40 acres of ground adjoining, on which additions will be built. The Inter-State stopped the building of passenger cars after America entered the war, and concentrated its energies on production of trucks for the army. This contract has just been completed.

Wallace Barnes Opens Branches

BRISTOL, CONN., April 1—The Wallace Barnes Co. has opened branch sales offices in New York City at 50 East Forty-second Street with Lisle K. Lasher in charge, and another in Detroit, 618 Book Building, with Brown Joyce in charge.

New Cars Not to Be Driven from Factory

DETROIT, March 27—Detroit automobile manufacturers are discouraging their distributors who come to the city with the intention of driving away their cars. The manufacturers declare an automobile leaving the factory new is not a new car when it reaches its destination of 500 to 1000 miles away.

Lancaster Steel Products Bought by General Motors

LANCASTER, PA., March 29—The Lancaster Steel Products Co. has been sold to the General Motors Co. and will be operated as a subsidiary, it is announced. H. B. Cochran of this city will remain at the head of the local concern.

Clinton Planning New Truck

DETROIT, March 28—The Clinton Motor Truck Co. is bringing out a new 1-ton truck. The new model was already on the market before the war, but owing to war work and scarcity of material manufacture was suspended. The Clinton Truck Co. will locate its main plant in Cleveland.

Parsons Mfg. Co. to Move

DETROIT, March 28—The Parsons Mfg. Co., now on Stanley Avenue, will shortly be located at Bellevue Street, where enlarged facilities will be available. The company will occupy 30,000 sq. ft. of floor space in its new quarters, and expects to be in full operation by April 15. The Parsons company makes concealed hinges for passenger car bodies, also coach locks for sedans, limousines and other closed cars.

Daylight Saving Conserves Coal

WASHINGTON, March 29—The United States Fuel Administration stated to-day that 1,250,000 tons of coal were saved during the 7 months last year when the daylight saving law was in effect.

Peerless Shows Smaller Profit This Year

CLEVELAND, March 29—Net profits of the Peerless Truck & Motor Corp. and subsidiary companies for 1918 were \$773,895, after all charges, interest, depreciation and \$71,596 reserved for Federal taxes were taken off. Although depreciation, costs, interest and taxes were less in 1918 than 1917, net profits were \$175,608 less and net sales \$7,039,373 less for 1918 than 1917.

The consolidated income account of the Peerless Motors Corporation and subsidiary companies for the year ended Dec. 31, 1918, compares as follows:

	1918	1917
Net sales.....	\$11,890,079	\$18,924,452
Cost of sales, plant.....	10,831,089	17,329,985
Depreciation of plant...	214,808	291,849
Net inc. from sales...	\$844,182	\$1,302,618
Other income.....	230,808	405,013
Total income.....	\$1,074,990	\$1,707,631
Deduct int. on notes....	229,113	300,000
Interest on bonds.....	.....	.....
Premium on bonds.....	.....	.....
Organization expenses..	.....	.....
Depreciation in investments	386	34,963
Fed. and income taxes.	71,596	306,799
Balance.....	\$773,895	\$1,065,870
Net loss on munitions..	.....	.....
Reserve for contingencies .....	.....	116,367
Net profits for year...	\$773,895	\$949,503

The consolidated balance sheet of the Peerless Motors Corporation, as of Dec. 31, 1918, compares as follows:

	Assets	
	1918	1917
Plant, land, etc.....	\$2,957,027	\$3,886,314
Patents, etc.....	2,862,035	3,710,520
Cash	1,790,890	2,869,569
Liberty bonds.....	1,600,731	.....
Marketable securities...	163,144	192,980
Inventories	2,465,448	5,318,743
Government claims.....	945,353	.....
General vehicle investments	50,429	63,413
Sundry debtors.....	67,775	111,299
Accounts and notes receivable	1,627,683	2,098,205
Cash and purchase....	22,890	29,190
Prepaid expenses.....	38,742	43,676
Total.....	\$14,592,147	\$18,323,903
	Liabilities	
Capital	\$4,898,110	\$4,898,110
Peerless Motor preferred stock	21,800	27,800
Funded debt.....	3,453,800	5,280,000
Accounts payable.....	917,122	1,264,414
Special deposits.....	.....	.....
Drafts discount.....	64,407	1,044,892
Sundry creditors	398,511	716,859
Contingent reserves.....	249,425	719,916
Surplus	4,588,972	4,371,918
Total.....	\$14,592,147	\$18,323,909

Despite the fact that net sales of the Peerless Truck & Motor Corp. show a decrease the corporation is in good financial condition. As of Dec. 31, 1918, cur-

rent assets were \$8,711,452 and current liabilities \$1,380,039, making net working capital \$7,331,413. Deducting from this the \$3,453,800 bonds now outstanding there remains \$3,877,613.

The signing of the armistice found Peerless with orders on hand covering substantially all of its truck material in process. These orders are about completed.

Crow-Elkhart Back on Its Feet

ELKHART, IND., March 31—The financial difficulties of the Crow-Elkhart Motor Co., brought on by war conditions, have been taken care of, and the company will soon resume normal production. Settlement of litigation following a petition for a receiver will enable the company to increase its output. H. T. Shafer & Co., Chicago, will have an interest in the concern from the fact that it will underwrite a bond issue of \$600,000.

Both the Indiana company and Arizona corporation, forming the Crow-Elkhart Motor Co., will be dissolved, and the business will be conducted by the Crow-Elkhart Motor Corp., with an authorized capitalization of \$10,000,000. H. T. Liggett, as a representative of H. T. Shafer & Co., will be auditor and treasurer. It is announced that the former stockholders will receive an equal amount of stock in the new corporation, while the creditors who had accepted a settlement on a 25 per cent basis will receive also an amount equal to 75 per cent in the stock of the new corporation. The company now has orders for all the cars that can be produced within the next six months.

\$801,607 Net Earnings of Hale & Kilburn

PHILADELPHIA, March 29—During the past year Hale & Kilburn Corp. has increased its net sales \$240,970 over 1917, and its net earnings \$216,212. Its balance sheet as of Dec. 31 last shows cash amounting to \$164,216; a surplus of \$498,404, and its total assets and liabilities, \$7,517,637. Net sales to the amount of \$4,476,552 and net earnings amounting to \$801,607 are reported in the financial statement of the company, which follows:

	1918.	1917.
Total net sales.....	\$4,476,552	\$4,235,582
Net earnings	781,024	542,328
Miscellaneous revenue...	17,583	43,067
Total net earnings....	\$801,607	\$585,355
Interest charges, taxes, etc.	403,764	323,238
Surplus	\$397,843	\$262,157

Dividends Declared

General Motors Corp., Pontiac; regular quarterly dividend, 3 per cent on common, 1 1/2 per cent on preferred and debenture stocks; all payable May 1 to stockholders of record April 15.

Standard Parts Co., Cleveland, 1 1/4 per cent, quarterly, preferred, payable April 1 to stockholders of record March 20.

Maibohm Surplus

Amounts to \$32,811

RACINE, March 29—A regular annual dividend of 6 per cent was declared at the annual meeting of the directors of the Maibohm Motors Co. The financial statement of the company for 1918 shows a surplus of \$47,370, of which \$14,559 was deducted to pay for the loss due to the fire on Dec. 3, leaving a net surplus of \$32,811. Operations were continued in spite of the damage done to the plant. The company was not engaged on any war contracts, but, although working only on its regular products, production was somewhat curtailed because of government restrictions.

The following officers were elected for the new year: President, H. C. Maibohm; vice-president, T. W. Cushing; secretary and treasurer, I. O. Bormann; works manager, W. C. Maibohm, and director, Albert Mohr.

The balance sheet for the year ended Dec. 31, 1918, shows:

	Assets	
Cash and cash items.....	\$157,272	
Inventories	50,960	
Deferred to operation.....	205,123	
Machinery and equipment.....	94,477	
Trademarks and good will.....	50,000	
		\$557,832
	Liabilities	
Current liabilities.....	\$30,509	
Reserves	3,575	
Dealers' deposits.....	4,624	
Outstanding stock.....	486,310	
Surplus	\$47,370	
Less fire loss.....	14,558	
		32,811
		\$557,832

American Veneer Co. Soon Ready for Production

HAYWARD, WIS., March 31—A concern manufacturing veneers, veneer panels and other select hardwood products is being established here by the American Veneer Co., incorporated last year with a capital stock of \$150,000. Work will start at once on a factory, 180 x 250 ft., to be ready about June 15, and to employ from 100 to 150 men.

Marwin Truck Co. Buys Leased Plant

KENOSHA, WIS., March 31—The Marwin Motor Truck Co. has acquired the former plant of the Skidd Mfg. Co., which it has been occupying since last fall under lease, and plans to erect several additions. The purchase price was \$22,500, and more than an equal amount will be invested in new buildings and equipment during the year. The present output of the company is two machines a day.

Arrow-Grip Enlarges

GLENS FALLS, N. Y., March 31—The Arrow-Grip Mfg. Co. has increased its capital stock from \$100,000 to \$500,000, and will commence the erection of a new factory building soon. It has also opened an export office at 16 West Sixty-first Street, New York City, and continues to operate its warehouse in Chicago.

War Department Will Sell Surplus Trucks and Cars

WASHINGTON, April 1—A possible surplus of Army trucks and passenger cars is now considered likely, and in event that there are more vehicles than can be used by the Army these will be disposed of by the Director of Sales according to a plan which is designed to protect both the War Department and the automobile industry.

After the inventories, which are now being taken by the War Department, are completed, if it is found that there is a surplus of motor vehicles, the different branches of the Government will first be consulted to learn whether the surplus can be used to fill their requirements.

Various manufacturers of automobiles and trucks will be next approached to ascertain whether they will take over the vehicles of their own make to market them with their own machines to secure a fair market price for the Government and at the same time prevent disturbances of market conditions.

The net surplus remaining after the various branches of the Government and the manufacturers have been consulted will be disposed of to the public either through auction or by sealed bids. Full publicity will be given this sale throughout the country in order that the Government may realize the best results. In the meantime the public should understand that no motor trucks or passenger cars are being sold. It is anticipated that between the various Government departments and the manufacturers, whatever surplus is available will be taken up by them.

Standard Grading of Singapore Rubber

WASHINGTON, March 26—The Rubber Association of the Singapore Chamber of Commerce will establish a standard for Singapore rubber. A Standard Qualities Committee examines all samples of rubber offered for sale by members of the association and grades them.

Two standard qualities are recognized: Latex crepe, which must be well prepared dry rubber of even color and free from all stains, spots and traces of oxidation; and F. A. Q. ribbed smoked sheet, which must be clean, tough rubber, free from mold, dampness or under or over-smoked sheets. The rules provide that all rubber sold as standard quality must

Decrease in February Oil Exports

WASHINGTON, April 2—The following is the complete tabulation showing the detailed decrease in oil exports, described briefly in the last issue of AUTOMOTIVE INDUSTRIES, for February and eight months previous:

be certified as such by the committee. The awards of the committee remain in force for one month from date of examination of sample. It is believed that this step will prove an important one and will result in "Singapore Standard" becoming of high rank in the markets of the world.

Pratt & Whitney to Make Hoke Gages

HARTFORD, CONN., April 2—The Pratt & Whitney Co. has secured the manufacturing rights for Hoke Precision Gages, which are now being made at the Bureau of Standards in Washington, as inspection and reference sets for Army and Navy use. The first sets ready for the market will consist of five blocks of 1-in., .5-in., .3-in., .2-in., .1-in., giving any tenth up to 2 in. The addition of $\frac{1}{8}$ -in., $\frac{1}{4}$ -in. and $\frac{3}{8}$ -in. sizes will provide any eighth or tenth up to $2\frac{1}{2}$ in. in a set of eight blocks; and the addition of $1\frac{1}{16}$ -in. and .05-in. blocks, making ten in all, will give any sixteenth or any .05-in. interval.

South May Have Tractor Plant

BIRMINGHAM, March 28—This city is being discussed as a likely location for the manufacture of the Mobile tractor, produced by the Mobile Tractor Co., which has its headquarters in Mobile. Officials of the company are desirous of putting up their own plant and plan to manufacture other automotive products along with the tractor. The northern and western demands are supplied through the Fort Wayne, Ind., plant, where the machine goes under the name Automotive tractor.

Freight Cars Released for Automobiles

NEW YORK, April 2—Regional railroad directors in the West and South have issued imperative orders that freight cars for the transportation of automobiles and which have been used for general purposes during the war must now be returned as speedily as possible into automobile manufacturing territory. In consequence 539 empty automobile cars passed east through Kansas City within a period of 48 hours last week. An official will be stationed in Detroit to have full control of the distribution of automobile cars in the Michigan-Toledo zone.

Elcock Returns to Atlanta Office of Cement Assn.

ATLANTA, April 2—Walter B. Elcock has returned as district engineer in charge of the Atlanta office of the Portland Cement Association, which position he left in March, 1917, to serve as Major of Infantry and Adjutant of the 157th Depot Brigade at Camp Gordon.

Government to Give Credit Ratings on Foreign Firms

NEW YORK, April 2—The Government is arranging to give American manufacturers credit ratings on foreign firms. Certain records and information obtained by the Bureau of War Trade Intelligence will be used as the nucleus to build up the service, which eventually will become a distinct bureau of the Government. For the present, the Washington office of the American Manufacturers' Export Association is prepared to answer inquiries regarding the financial responsibility of foreign firms.

Porter New Chief Engineer for Curtiss

NEW YORK, April 1—F. R. Porter has been appointed chief motor engineer of the Curtiss Engineering Corp., Garden City, L. I., where the experimental work of the Curtiss company is carried on. He has also been appointed chief engineer of the Curtiss Aeroplane & Motor Corp., Buffalo. His headquarters will be at Garden City. For the past year Mr. Porter was chief engineer at McCook Field for the Government, and in that capacity had to handle all new inventions in connection with engines and accessories.

Toby American Commerce Chamber Secretary

NEW YORK, April 2—George P. Toby has been appointed executive secretary of the American Chamber of Commerce in London. He will sail from New York about May 12.

To Build Texas Helium Plant

WASHINGTON, April 1—A helium plant is being constructed by the Government at North Fort Worth, Tex., to provide helium gas for airships. The plant will cost \$900,000. Helium is a gas recently found to be particularly adapted to the filling of balloons. It is said to have 92 per cent of the lifting power of hydrogen and is not inflammable. The products of certain natural gas wells in Clay County, Tex., have been found best suited for the extraction of helium, and pipe lines will be arranged to Fort Worth.

Duplex Governor Chicago Office Moves

CHICAGO, April 2—The office of the Duplex Engine Governor Co. has been moved from 220 S. State Street to 28 East Jackson Boulevard.

Soss in Charge of Detroit Branch

BROOKLYN, N. Y., April 2—Samuel Soss has been placed in charge of the Detroit branch of the Soss Mfg. Co.

	February, 1919		February, 1918		Eight Months Ended February, 1919		Eight Months Ended February, 1918	
	Gal.	Value	Gal.	Value	Gal.	Value	Gal.	Value
Mineral oils	165,689,425	\$25,448,791	221,579,890	\$24,031,982	1,755,072,757	\$236,411,462	1,774,312,127	\$183,933,493
Crude mineral oil	7,707,112	415,911	19,734,996	1,005,760	124,806,406	7,848,846	119,053,739	5,568,194
Illuminating oil	64,679,339	7,347,172	29,878,381	3,262,420	371,234,786	40,124,851	362,375,485	31,176,908
Lubricating oil	29,627,360	9,476,195	17,707,037	4,826,359	180,309,847	58,216,030	178,125,460	40,994,987
Gasoline, naphtha, etc.	26,964,764	6,373,852	35,396,038	8,426,107	360,433,084	89,474,987	272,424,081	65,089,146
Residuum, fuel oil, etc.	36,710,850	1,835,661	118,863,438	6,511,336	718,288,634	40,746,748	842,333,352	41,104,258

Calendar

ENGINEERING

SHOWS

March 29-April 5—Passenger Cars. April 8-12—Trucks, Brooklyn. Brooklyn Motor Vehicle Dealers' Assn. I. C. Kirkman, Manager.

March 31-April 5—Cumberland, Md., Automobile Dealers Assn., Armory.

March 31-Apr. 5—New Orleans, La. Henry B. Marks, Manager.

April 1-5—Denver, Col.—Denver Automobile Trades Assn. Stadium.

April 3—Macon, Ga. Motor Truck Demonstration, Macon Automobile Chamber of Commerce.

April 5-12—Bridgeton, N. J. Fourth Annual, Automobile Dealers' Assn.

April 5-12—Montreal, Can.—National Motor Show of Eastern Canada, Victoria Rink. T. C. Kirby, Manager.

April 8-12—Deadwood, S. D. Seventh Annual Cars and Tractors, Deadwood Business Club.

Foreign Trade Opportunities

WASHINGTON, March 31—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade opportunity number.

Algeria—Agricultural machinery, petroleum for lighting and motors; automobiles. Correspondence should be in French. No. 28844.

Australia—Motor car and motorcycle accessories, motor car body and top materials and trimmings. Quotations should be given f.o.b. New York. The goods ordered will be handled and paid for by a firm in New York City. No. 28852.

Italy—Automobiles of 12 to 15 and 15 to 20 hp. Correspondence may be in Italian or French. Payment will be made on receipt of goods through bank. No. 28854.

Italy—An agency for automobiles and motorcycles. Correspondence may be in English. No. 28834.

Italy—An agency for agricultural apparatus. Correspondence may be in English. No. 28789.

A British Indian company, with buying headquarters in New York City, wishes to purchase direct from manufacturers automobiles and accessories. Payment will be made against documents in New York. No. 28794.

France—An agency for southern France of automobiles and trucks. No. 28795.

Switzerland—Agencies for cheap and medium priced automobiles. Correspondence should be in French or Italian. No. 28816.

Italy—An agency for motorcycles. Correspondence should be in French or Italian. No. 28823.

Mead-Davis for Distribution, Sales and Advertising

CHICAGO, March 29—The Mead-Davis Co. has been formed with temporary offices at 814 Hearst Building. Its activities will include factory products distribution, sales and advertising. F. L. Mead will be in charge of the sales department and B. E. Davis, head of the advertising department. Mr. Mead resigned his position as general sales manager of the Dearborn Truck Co., where

April 16-19—Waynesburg, Pa. Automobile Dealers' Assn. of Greene Co., Armory. Frank L. Hoover, Mgr.

May 10-17—Bristol, Va.-Tenn. Cars, Trucks, Tractors, Airplanes and Accessories. Bristol Chamber of Commerce. C. W. Roberts, Manager.

June 2-6—Hot Springs, Va. Convention, Automotive Equipment Assn., Homestead Hotel.

*Oct. 15—Paris. Grand Palais, International Automobile Mfrs. Congress.

Nov. 7-15—London—Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.

December—Brussels. International Automobile Mfrs. Congress.

January—New York. International Automobile Mfrs. Congress.

February—Chicago. International Automobile Mfrs. Congress.

TRACTOR SHOWS

April 15—Walla Walla, Wash. Sectional Tractor Demonstrations.

May 5—Sacramento, Cal. Sectional Tractor Demonstrations, Demonstration Field.

June—Denver, Col. Sectional Tractor Demonstrations.

July—Wichita, Kan. Automotive Committee of National Implement Assn.

Aug.—Aberdeen, S. D. Sectional Tractor Demonstrations.

RACES

†May 17—Uniontown, Pa., probably 112½ miles.

†May 31—Indianapolis, Indianapolis Motor Speedway Assn., 500 miles.

*July 5—Cincinnati, O., Speedway.

*July 19—Uniontown, Pa. Speedway race.

*July 26—Sheepshead Bay, L. I. Speedway race.

*Aug. 22-23—Elgin, Ill. Speedway.

*Aug. 23—Sheepshead Bay, L. I. Speedway race.

*Sept. 1—Uniontown, Pa. Speedway race.

*Sept. 20—Sheepshead Bay, L. I. Speedway race.

*Oct. 1—Cincinnati, O. Speedway race.

†Sanctioned.

*Tentative dates.

CONVENTIONS

April 10-12—Philadelphia. National Assn. of Motor Truck Sales Mgrs., Bellevue-Stratford.

April 24-26—Chicago—National Foreign Trade Council. Sixth National Foreign Trade Convention. Congress Hotel.

May 1-June 1—Atlantic City, N. J.—Pan-American Aeronautic Convention and Exhibition—Aero Club of America, the Aerial League of America and the Pan-American Aeronautic Federation.

he has been for three years, on Feb. 1. He has also been connected with the General Motors Truck Co., Buick Automobile Co. and Oakland Motors Co. Mr. Davis has been advertising manager for the Dearborn Truck Co. for the past two years. The new company plans to act as director of advertising and sales for manufacturers.

Parts Coming From Louisville

LOUISVILLE, March 31—Announcement was made here to-day by the Louisville Industrial Foundation that the Louisville Pattern Works, specializing in patterns for automobile parts, will begin operations within 30 days. The concern has been incorporated for \$15,000, the incorporators being John F. Reeder, A. J. Roth and P. W. Roth of Muncie, Ind., where they have been engaged in pattern and foundry work for motor cars. Only skilled labor will be employed. Machinery and equipment have been ordered and will be installed as soon as the plant's location is selected. The concern is considering several sites. It will make patterns for engines, cylinders, crank cases, transmission cases and other automobile parts.

General Motors to Build 1000 Homes

FLINT, MICH., March 28—Work is about to start on construction of 1000 homes for Buick and Chevrolet employees, which will be completed by Dec. 1. The General Motors takes this action to relieve the house shortage here, which is becoming acute. The new homes will be built on the outskirts of this city, in Flint township. The company proposes to construct sewers, water mains, pavements, sidewalks and to provide recreation centers. The homes will be sold on an easy payment plan.

Overland Mechanics O.K. Wage Scale

TOLEDO, O., March 31—Machinist employees of the Overland plant met Saturday and approved the Willys-Overland new wage scale agreement. The agreement will affect the Overland plants at Toledo, Elyria, O., and Elmira, N. Y. A sliding scale will be asked, with a minimum wage increase from 55 cents to 70 cents an hour for machinists, and other scales have been written for helpers and similar workers.

Onondaga Steel Adds to Directorate

SYRACUSE, N. Y., March 29—Morton D. Whitford, treasurer of the Semet-Solvay Co. and a director of the Syracuse Trust Co., and Charles H. Canfield, general auditor of the company, have been added to the directorate of the Onondaga Steel Co., Inc. The company is planning to move its offices and remaining furnace and melting equipment to its newly acquired site at Eastwood this spring. Plans have been made for the immediate construction of a temporary office building, and an addition to the main building, 40 x 40 ft., to house the blacksmith shop and the small hammer shop.

Tractor Service Book

We have received from the Gurney Ball Bearing Co., Jamestown, N. Y., a copy of a recently issued Tractor Service Book. It contains instructions for the care and operation of tractors, particularly in relation to bearings, lubrication, engine starting and magneto and other electrical equipment. There are also an article on the draft of tillage implements, an article on field operation and adjustment of light farm tractors, the tractor standards adopted by the S. A. E., miscellaneous data and a number of blank sheets on which data concerning plowing operations can be entered.